Snort++ User Manual

REVISION HISTORY			
NUMBER	DATE	DESCRIPTION	NAME

Contents

1 Overview **1**

1.1 Configuration . . . 2
1.2 Modules . . . 2
1.3 Plugins and Scripts . . . 3
1.4 New Http Inspector . . . 3
1.5 Binder and Wizard . . . 4
1.6 Packet Processing . . . 5

2 Getting Started **6**

2.1 Dependencies . . . 6
2.2 Building . . . 7
2.3 Run . . . 8
2.4 Tips . . . 9
2.5 Help . . . 10
2.6 Common Errors . . . 10
2.7 Gotchas . . . 11
2.8 Bugs . . . 12
2.8.1 Build . . . 12
2.8.2 Config . . . 12
2.8.3 Rules . . . 13
2.8.4 snort2lua . . . 13
2.8.5 Runtime . . . 13

3 Basic Modules **13**

3.1 active . . . 14
3.2 alerts . . . 14
3.3 attribute_table . . . 14
3.4 classifications . . . 15
3.5 daq . . . 15
3.6 decode . . . 16
3.7 detection . . . 16
3.8 event_filter . . . 17
3.9 event_queue . . . 17
3.10 file_id . . . 17
3.11 hosts . . . 18
3.12 ips . . . 19
3.13 network . . . 19

3.14 output . . . 19
3.15 packets . . . 20
3.16 process . . . 20
3.17 profiler . . . 21
3.18 rate_filter . . . 21
3.19 references . . . 21
3.20 rule_state . . . 22
3.21 search_engine . . . 22
3.22 snort . . . 23
3.23 suppress . . . 26

4 Codec Modules **26**

4.1 arp . . . 27
4.2 auth . . . 27
4.3 eapol . . . 27
4.4 erspan2 . . . 27
4.5 erspan3 . . . 27
4.6 esp . . . 28
4.7 eth . . . 28
4.8 fabricpath . . . 28
4.9 gre . . . 28
4.10 gtp . . . 28
4.11 icmp4 . . . 29
4.12 icmp6 . . . 30
4.13 igmp . . . 30
4.14 ipv4 . . . 30
4.15 ipv6 . . . 31
4.16 mpls . . . 32
4.17 pgm . . . 32
4.18 pppoe . . . 33
4.19 tcp . . . 33
4.20 token_ring . . . 34
4.21 udp . . . 34
4.22 vlan . . . 34
4.23 wlan . . . 35

5 Inspector Modules **35**

5.1 arp_spoof . . . 35
5.2 back_orifice . . . 35
5.3 binder . . . 36
5.4 data_log . . . 36
5.5 dnp3 . . . 37
5.6 dns . . . 37
5.7 dpx . . . 38
5.8 ftp_client . . . 38
5.9 ftp_data . . . 38
5.10 ftp_server . . . 39
5.11 gtp_inspect . . . 40
5.12 http_global . . . 40
5.13 http_inspect . . . 42
5.14 imap . . . 45
5.15 modbus . . . 45
5.16 new_http_inspect . . . 46
5.17 normalizer . . . 48
5.18 perf_monitor . . . 51
5.19 pop . . . 51
5.20 port_scan . . . 52
5.21 port_scan_global . . . 53
5.22 reputation . . . 54
5.23 rpc_decode . . . 54
5.24 sip . . . 55
5.25 smtp . . . 57
5.26 ssh . . . 59
5.27 ssl . . . 59
5.28 stream . . . 60
5.29 stream_file . . . 61
5.30 stream_icmp . . . 61
5.31 stream_ip . . . 62
5.32 stream_tcp . . . 63
5.33 stream_udp . . . 65
5.34 stream_user . . . 65
5.35 telnet . . . 65
5.36 wizard . . . 66

6 IPS Action Modules **66**

6.1 react . . . 66
6.2 reject . . . 67
6.3 rewrite . . . 67

7 IPS Option Modules **67**

7.1 ack . . . 67
7.2 asn1 . . . 67
7.3 base64_decode . . . 68
7.4 bufferlen . . . 68
7.5 byte_extract . . . 68
7.6 byte_jump . . . 69
7.7 byte_test . . . 69
7.8 classtype . . . 70
7.9 content . . . 70
7.10 cvs . . . 70
7.11 detection_filter . . . 70
7.12 dnp3_data . . . 71
7.13 dnp3_func . . . 71
7.14 dnp3_ind . . . 71
7.15 dnp3_obj . . . 71
7.16 dsize . . . 71
7.17 file_data . . . 71
7.18 flags . . . 72
7.19 flow . . . 72
7.20 flowbits . . . 72
7.21 fragbits . . . 72
7.22 fragoffset . . . 73
7.23 gid . . . 73
7.24 gtp_info . . . 73
7.25 gtp_type . . . 73
7.26 gtp_version . . . 73
7.27 http_client_body . . . 73
7.28 http_cookie . . . 74
7.29 http_header . . . 74
7.30 http_method . . . 74
7.31 http_raw_cookie . . . 74
7.32 http_raw_header . . . 74
7.33 http_raw_uri . . . 74

7.34 http_stat_code . . . 74
7.35 http_stat_msg . . . 74
7.36 http_uri . . . 74
7.37 icmp_id . . . 75
7.38 icmp_seq . . . 75
7.39 icode . . . 75
7.40 id . . . 75
7.41 ip_proto . . . 75
7.42 ipopts . . . 75
7.43 isdataat . . . 76
7.44 itype . . . 76
7.45 md5 . . . 76
7.46 metadata . . . 76
7.47 modbus_data . . . 76
7.48 modbus_func . . . 77
7.49 modbus_unit . . . 77
7.50 msg . . . 77
7.51 pcre . . . 77
7.52 pkt_data . . . 77
7.53 pkt_num . . . 77
7.54 priority . . . 78
7.55 raw_data . . . 78
7.56 reference . . . 78
7.57 regex . . . 78
7.58 rem . . . 78
7.59 replace . . . 79
7.60 rev . . . 79
7.61 rpc . . . 79
7.62 seq . . . 79
7.63 session . . . 79
7.64 sha256 . . . 80
7.65 sha512 . . . 80
7.66 sid . . . 80
7.67 sip_body . . . 80
7.68 sip_header . . . 80
7.69 sip_method . . . 80
7.70 sip_stat_code . . . 81
7.71 so . . . 81
7.72 soid . . . 81

7.73 ssl_state . . . 81
7.74 ssl_version . . . 82
7.75 stream_reassemble . . . 82
7.76 stream_size . . . 82
7.77 tag . . . 83
7.78 tos . . . 83
7.79 ttl . . . 83
7.80 urg . . . 83
7.81 window . . . 83

8 Search Engine Modules **84**

9 SO Rule Modules **84**

10 Logger Modules **84**
10.1 alert_csv . . . 84
10.2 alert_ex . . . 84
10.3 alert_fast . . . 84
10.4 alert_full . . . 85
10.5 alert_syslog . . . 85
10.6 log_codecs . . . 85
10.7 log_hext . . . 85
10.8 log_pcap . . . 86
10.9 unified2 . . . 86

11 DAQ Modules **86**
11.1 Building the DAQ Library and DAQ Modules . . . 86
11.2 PCAP Module . . . 87
11.3 AFPACKET Module . . . 87
11.4 NFQ Module . . . 88
11.5 IPQ Module . . . 88
11.6 IPFW Module . . . 89
11.7 Dump Module . . . 89
11.8 Netmap Module . . . 89
11.8.1 FreeBSD . . . 90
11.8.2 Linux . . . 90
11.9 Notes on iptables . . . 90
11.10 Notes on FreeBSD::IPFW . . . 91
11.11 Notes on OpenBSD::IPFW . . . 93
11.12 Socket Module . . . 93
11.13 File Module . . . 94
11.14 Hext Module . . . 94

12 Snort++ vs Snort **95**
12.1 Build Options . . . 96
12.2 Command Line . . . 96
12.3 Conf File . . . 96
12.4 Rules . . . 97
12.5 Output . . . 98
12.6 HTTP Profiles . . . 98

13 Snort2Lua **99**
13.1 Snort2Lua Command Line . . . 100
13.1.1 Usage: snort2lua [OPTIONS]... -c <snort_conf> 100
Options: . . . 100
Required option: . . . 101
Default values: . . . 101
13.2 Known Problems . . . 102
13.3 Usage . . . 102

14 Extending Snort++ **103**
14.1 Plugins . . . 103
14.2 Modules . . . 103
14.3 Inspectors . . . 104
14.4 Codecs . . . 104
14.5 IPS Actions . . . 107
14.6 Developers Guide . . . 107
14.7 Piglet Test Harness . . . 107
14.8 Piglet Lua API . . . 108
14.8.1 Plugin Instances . . . 108
Interface Objects . . . 109

15 Coding Style **114**
15.1 General . . . 114
15.2 Naming . . . 114
15.3 Comments . . . 114
15.4 Logging . . . 115
15.5 Types . . . 115
15.6 Macros (aka defines) . . . 115
15.7 Formatting . . . 115
15.8 Headers . . . 116
15.9 Warnings . . . 117
15.10 Other . . . 117
15.11 Uncrustify . . . 117

16 Reference **118**

16.1 Terminology . . . 118
16.2 Usage . . . 118
16.2.1 Environment . . . 119
16.2.2 Help . . . 119
16.2.3 Sniffing and Logging . . . 119
16.2.4 Configuration . . . 120
16.2.5 IDS mode . . . 120
16.3 Plugins . . . 121
16.4 Output Files . . . 121
16.4.1 DAQ Alternatives . . . 122
16.4.2 Logger Alternatives . . . 122
16.4.3 Shell . . . 122
16.4.4 Signals . . . 123
16.5 Optional Features . . . 124
16.6 Environment Variables . . . 124
16.7 Command Line Options . . . 124
16.8 Parameters . . . 128
16.9 Configuration . . . 129
16.10 Counts . . . 151
16.11 Generators . . . 160
16.12 Builtin Rules . . . 162
16.13 Command Set . . . 174
16.14 Signals . . . 174
16.15 Configuration Changes . . . 175
16.16 Module Listing . . . 179
16.16.1 Plugin Listing . . . 185

```
 ,,_     -*> Snort++ <*-
o"  )~   Version 3.0.0-a3 (Build 182) from 2.9.7-177
 ''''    By Martin Roesch & The Snort Team
         http://snort.org/contact#team
         Copyright (C) 2014-2015 Cisco and/or its affiliates. All rights reserved.
         Copyright (C) 1998-2013 Sourcefire, Inc., et al.
```

1 Overview

Snort++ is an updated version of the Snort IPS (intrusion prevention system). This document assumes you have some familiarity with Snort and are looking to see what Snort++ has to offer. Here are some of the basic goals for Snort++:

- Support multiple packet processing threads
- Use a shared configuration and attribute table
- Use a simple, scriptable configuration
- Make key components pluggable
- Autogenerate reference documentation
- Autodetect services for portless configuration
- Support sticky buffers in rules
- Provide better cross platform support

The above goals are met with this first alpha release. Additional, longer-term goals are:

- Use a shared network map
- Support pipelining of packet processing
- Support hardware offload and data plane integration

- Rewrite critical modules like TCP reassembly and HTTP inspection
- Support proxy mode
- Facilitate component testing
- Simplify memory management
- Provide all of Snort's functionality

This first alpha release is based on Snort 2.9.6-9 and excludes all but one of Snort's dynamic preprocessors. Work is underway to port that functionality and additions will be rolled out as they become available.

1.1 Configuration

Note that retaining backwards compatibility is not a goal. While Snort++ leverages some of the Snort code base, a lot has changed. The configuration of Snort++ is done with Lua, so your old conf won't work as is. Rules are still text based but nonetheless incompatible. However, Snort2Lua will help you convert your conf and rules to the new format.

The original Snort manual may be useful for some background information not yet documented for Snort++. The configuration differences are given in this manual.

1.2 Modules

Snort++ is organized into a collection of builtin and plugin modules. If a module has parameters, it is configured by a Lua table of the same name. For example, we can see what the active module has to offer with this command:

```
$ snort --help-module active

What: configure responses

Type: basic

Configuration:

int active.attempts = 0: number of TCP packets sent per response (with
varying sequence numbers) { 0:20 }

string active.device: use 'ip' for network layer responses or 'eth0' etc
for link layer

string active.dst_mac: use format '01:23:45:67:89:ab'

int active.max_responses = 0: maximum number of responses { 0: }

int active.min_interval = 255: minimum number of seconds between
responses { 1: }
```

This says active is a basic module that has several parameters. For each, you will see:

```
type module.name = default: help { range }
```

For example, the active module has a max_responses parameter that takes non-negative integer values and defaults to zero. We can change that in Lua as follows:

```
active = { max_responses = 1 }
```

or:

```
active = { }
active.max_responses = 1
```

If we also wanted to limit retries to at least 5 seconds, we could do:

```
active = { max_responses = 1, min_interval = 5 }
```

1.3 Plugins and Scripts

There are several plugin types:

- Codec - to decode and encode packets
- Inspector - like the prior preprocessors, for normalization, etc.
- IpsOption - for detection in Snort++ IPS rules
- IpsAction - for custom rule actions
- Logger - for handling events
- Mpse - for fast pattern matching
- So - for dynamic rules

Most plugins can be built statically or dynamically. By default they are all static. There is no difference in functionality between static or dynamic plugins but the dynamic build generates a slightly lighter weight binary. Either way you can add dynamic plugins with --plugin-path and newer versions will replace older versions, even when built statically.

The power of plugins is that they have a very focused purpose and can be created with relative ease. For example, you can extend the rule language by writing your own IpsOption and it will plug in and function just like existing options. The extra directory has examples of each type of plugin.

Some things just need to be tweaked or prototyped quickly. In addition to the Lua conf, which is a script that can contain functions to compute settings, etc., you can also script Loggers and IpsOptions.

1.4 New Http Inspector

One of the major undertakings for Snort 3.0 is developing a completely new HTTP inspector. It is incomplete right now but you can examine the work-in-progress. You can configure it by adding:

```
new_http_inspect = {}
```

to your snort.lua configuration file. Or you can read it in the source code under src/service_inspectors/nhttp_inspect.

The classic HTTP preprocessor is still available in the alpha release as http_inspect. It's probably the better choice for now if you just want to do some work and do not feel like experimenting. Be sure not to configure both old and new HTTP inspectors at the same time.

So why a new HTTP inspector?

For starters it is object-oriented. That's good for us because we maintain this software. But it should also be really nice for open-source developers. You can make meaningful changes and additions to HTTP processing without having to understand the whole thing. In fact much of the new HTTP inspector's knowledge of HTTP is centralized in a series of tables where it can be easily reviewed and modified. Many significant changes can be made just by updating these tables.

New_http_inspect is the first inspector written specifically for the new Snort 3.0 architecture. That provides access to one of the very best features of Snort 3.0: purely PDU-based inspection. Classic http_inspect processes HTTP messages, but even while doing so it is constantly aware of IP packets and how they divide up the TCP data stream. The same HTTP message might be processed differently depending on how the sender (bad guy) divided it up into IP packets.

New_http_inspect is free of this burden and can focus exclusively on HTTP. That makes it much more simple, easier to test, and less prone to false positives. It also greatly reduces the opportunity for adversaries to probe the inspector for weak spots by adjusting packet boundaries to disguise bad behavior.

Dealing solely with HTTP messages also opens the door for developing major new features. The new_http_inspect design supports true stateful processing. Want to ask questions that involve both the client request and the server response? Or different requests in the same session? These things are possible.

Another new feature on the horizon is HTTP/2 analysis. HTTP/2 derives from Google's SPDY project and is in the process of being standardized. Despite the name, it is better to think of HTTP/2 not as a newer version of HTTP/1.1, but rather a separate protocol layer that runs under HTTP/1.1 and on top of TLS or TCP. It's a perfect fit for the new Snort 3.0 architecture because a new HTTP/2 inspector would naturally output HTTP/1.1 messages but not any underlying packets. Exactly what the new_http_inspect wants to input.

New_http_inspect is taking a very different approach to HTTP header fields. Classic http_inspect divides all the HTTP headers following the start line into cookies and everything else. It normalizes the two pieces using a generic process and puts them in buffers that one can write rules against. There is some limited support for examining individual headers within the inspector but it is very specific.

The new concept is that every header should be normalized in an appropriate and specific way and individually made available for the user to write rules against it. If for example a header is supposed to be a date then normalization means put that date in a standard format.

1.5 Binder and Wizard

One of the fundamental differences between Snort and Snort++ concerns configuration related to networks and ports. Here is a brief review of Snort's configuration for network and service related components:

- Snort's configuration has a default policy and optional policies selected by VLAN or network (with config binding).
- Each policy contains a user defined set of preprocessor configurations.
- Each preprocessor has a default configuration and some support non-default configurations selected by network.
- Most preprocessors have port configurations.
- The default policy may also contain a list of ports to ignore.

In Snort++, the above configurations are done in a single module called the binder. Here is an example:

```
binder =
{
    -- allow all tcp port 22:
    -- (similar to snort 2.X config ignore_ports)
    { when = { proto = 'tcp', ports = '22' }, use = { action = 'allow' } },

-- select a config file by vlan
-- (similar to snort 2.X config binding by vlan)
{ when = { vlans = '1024' }, use = { file = 'vlan.lua' } },

-- use a non-default HTTP inspector for port 8080:
-- (similar to a snort 2.X targeted preprocessor config)
{ when = { nets = '192.168.0.0/16', proto = 'tcp', ports = '8080' },
  use = { name = 'alt_http', type = 'http_inspect' } },
```

```
-- use the default inspectors:
-- (similar to a snort 2.X default preprocessor config)
{ when = { proto = 'tcp' }, use = { type = 'stream_tcp' } },
{ when = { service = 'http' }, use = { type = 'http_inspect' } },

    -- figure out which inspector to run automatically:
    { use = { type = 'wizard' } }
}
```

Bindings are evaluated when a session starts and again if and when service is identified on the session. Essentially, the bindings are a list of when-use rules evaluated from top to bottom. The first matching network and service configurations are applied. binder.when can contain any combination of criteria and binder.use can specify an action, config file, or inspector configuration.

Using the wizard enables port-independent configuration and the detection of malware command and control channels. If the wizard is bound to a session, it peeks at the initial payload to determine the service. For example, *GET* would indicate HTTP and *HELO* would indicate SMTP. Upon finding a match, the service bindings are reevaluated so the session can be handed off to the appropriate inspector. The wizard is still under development; if you find you need to tweak the defaults please let us know.

Additional Details:

- If the wizard and one or more service inspectors are configured w/o explicitly configuring the binder, default bindings will be generated which should work for most common cases.
- Also note that while Snort 2.X bindings can only be configured in the default policy, each Snort 3.0 policy can contain a binder leading to an arbitrary hierarchy.
- The entire configuration can be reloaded and hot-swapped during run-time via signal or command in both Snort 2.X and 3.0. Ultimately, Snort 3.0 will support commands to update the binder on the fly, thus enabling incremental reloads of individual inspectors.
- Both Snort 2.X and 3.0 support server specific configurations via a hosts table (XML in Snort 2.X and Lua in Snort 3.0). The table allows you to map network, protocol, and port to a service and policy. This table can be reloaded and hot-swapped separately from the config file.
- You can find the specifics on the binder, wizard, and hosts tables in the manual or command line like this: snort --help-module binder, etc.

1.6 Packet Processing

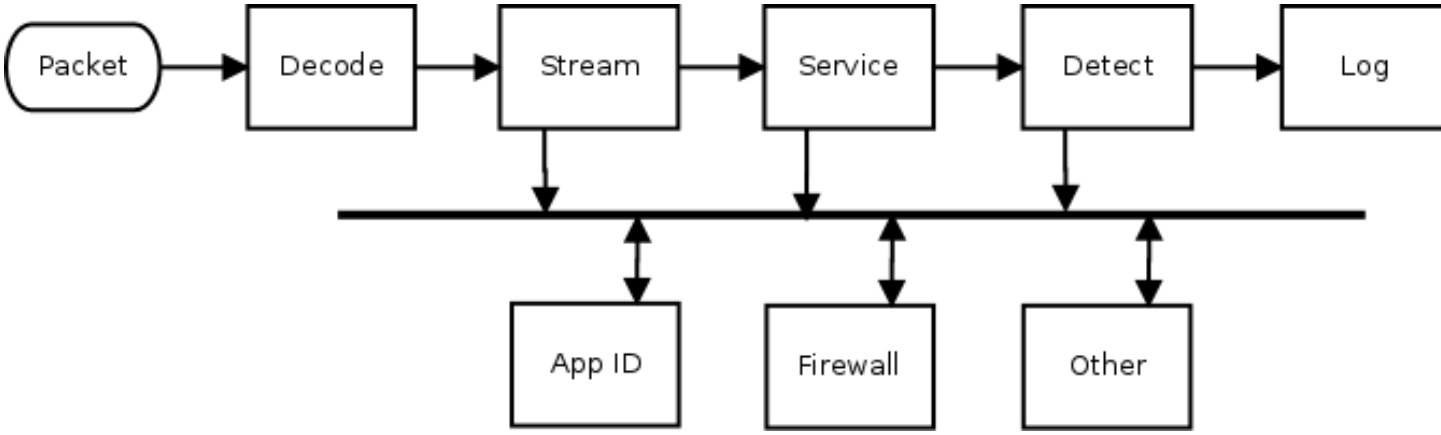
One of the goals of Snort++ is to provide a more flexible framework for packet processing by implementing an event-driven approach. Another is to produce data only when needed, to minimize expensive normalizations. To help explain these concepts, let's start by examining how Snort processes packets. The key steps are given in the following figure:

The preprocess step is highly configurable. Arbitrary preprocessors can be loaded dynamically at startup, configured in snort.conf, and then executed at runtime. Basically, the preprocessors are put into a list which is iterated for each packet. Recent versions have tweaked the list handling some, but the same basic architecture has allowed Snort to grow from a sniffer, with no preprocessing, to a full-fledged IPS, with lots of preprocessing.

While this "list of plugins" approach has considerable flexibility, it hampers future development when the flow of data from one preprocessor to the next depends on traffic conditions, a common situation with advanced features like application identification. In this case, a preprocessor like HTTP may be extracting and normalizing data that ultimately is not used, or app ID may be repeatedly checking for data that is just not available.

Callbacks help break out of the preprocess straightjacket. This is where one preprocessor supplies another with a function to call when certain data is available. Snort has started to take this approach to pass some HTTP and SIP preprocessor data to app ID. However, it remains a peripheral feature and still requires the production of data that may not be consumed.

The basic processing steps Snort++ takes are similar to Snort's as seen in the following diagram. The preprocess step employs specific inspector types instead of a generalized list, but the basic procedure includes stateless packet decoding, TCP stream reassembly, and service specific analysis in both cases. (Snort++ provides hooks for arbitrary inspectors, but they are not central to basic flow processing and are not shown.)



However, Snort++ also provides a more flexible mechanism than callback functions. By using inspection events, it is possible for an inspector to supply data that other inspectors can process. This is known as the observer pattern or publish-subscribe pattern.

Note that the data is not actually published. Instead, access to the data is published, and that means that subscribers can access the raw or normalized version(s) as needed. Normalizations are done only on the first access, and subsequent accesses get the previously normalized data. This results in just in time (JIT) processing.

A basic example of this in action is provided by the extra data_log plugin. It is a passive inspector, ie it does nothing until it receives the data it subscribed for (*other* in the above diagram). By adding data_log = { key = *http_raw_uri* } to your snort.lua configuration, you will get a simple URI logger.

Inspection events coupled with pluggable inspectors provide a very flexible framework for implementing new features. And JIT buffer stuffers allow Snort++ to work smarter, not harder. These capabilities will be leveraged more and more as Snort++ development continues.

2 Getting Started

The following pointers will help you get started:

2.1 Dependencies

Required:

- autotools or cmake to build from source
- g++ >= 4.8 or other recent C++11 compiler
- daq from http://www.snort.org for packet IO
- dnet from https://github.com/dugsong/libdnet.git for network utility functions
- LuaJIT from http://luajit.org for configuration and scripting
- pcap from http://www.tcpdump.org for tcpdump style logging

- pcre from http://www.pcre.org for regular expression pattern matching
- zlib from http://www.zlib.net for decompression (>= 1.2.8 recommended)
- pkgconfig from http://www.freedesktop.org to build the example plugins

Optional:

- lzma >= 5.1.2 from http://tukaani.org/xz/ for decompression of SWF and PDF files
- openssl from https://www.openssl.org for SHA and MD5 file signatures and the protected_content rule option
- hyperscan from https://github.com/01org/hyperscan to build new and improved regex and (coming soon) fast pattern support
- cpputest from http://cpputest.github.io to run additional unit tests with make check
- asciidoc from http://www.methods.co.nz/asciidoc/ to build the HTML manual
- dblatex from http://dblatex.sourceforge.net to build the pdf manual (in addition to asciidoc)
- w3m from http://sourceforge.net/projects/w3m/ to build the plain text manual
- source-highlight from http://www.gnu.org/software/src-highlite/ to generate the dev guide

2.2 Building

- Optionally built features are listed in the reference section.
- Create an install path:

```
export my_path=/path/to/snorty
mkdir -p $my_path
```

- If you are using a github clone with autotools, do this:

```
autoreconf -isvf
```

- Now do one of the following:

  a. To build with autotools, simply do the usual from the top level directory:

  ```
  ./configure --prefix=$my_path
  make -j 8
  make install
  ```

  b. To build with cmake and make, run configure_cmake.sh. It will automatically create and populate a new subdirectory named *build*.

  ```
  ./configure_cmake.sh --prefix=$my_path
  cd build
  make -j 8
  make install
  ln -s $my_path/conf $my_path/etc
  ```

  c. You can also specify a cmake project generator:

  ```
  ./configure_cmake.sh --generator=Xcode --prefix=$my_path
  ```

  d. Or use ccmake directly to configure and generate from an arbitrary build directory like one of these:

```
ccmake -G Xcode /path/to/Snort++/tree
open snort.xcodeproj

ccmake -G "Eclipse CDT4 - Unix Makefiles" /path/to/Snort++/tree
run eclipse and do File > Import > Existing Eclipse Project
```

- To build with g++ on OS X where clang is installed, do this first:

```
export CXX=g++
```

2.3 Run

First set up the environment:

```
export LUA_PATH=$my_path/include/snort/lua/\?.lua\;\;
export SNORT_LUA_PATH=$my_path/etc/snort/
```

Then give it a go:

- Get some help:

```
$my_path/bin/snort --help
$my_path/bin/snort --help-module suppress
$my_path/bin/snort --help-config | grep thread
```

- Examine and dump a pcap:

```
$my_path/bin/snort -r <pcap>
$my_path/bin/snort -K text -d -e -q -r <pcap>
```

- Verify config, with or w/o rules:

```
$my_path/bin/snort -c $my_path/etc/snort/snort.lua
$my_path/bin/snort -c $my_path/etc/snort/snort.lua -R $my_path/etc/snort/sample. ↩
    rules
```

- Run IDS mode. To keep it brief, look at the first n packets in each file:

```
$my_path/bin/snort -c $my_path/etc/snort/snort.lua -R $my_path/etc/snort/sample. ↩
    rules \
     -r <pcap> -A alert_test -n 100000
```

- Let's suppress 1:2123. We could edit the conf or just do this:

```
$my_path/bin/snort -c $my_path/etc/snort/snort.lua -R $my_path/etc/snort/sample. ↩
    rules \
     -r <pcap> -A alert_test -n 100000 --lua "suppress = { { gid = 1, sid = 2123 } ↩
         }"
```

- Go whole hog on a directory with multiple packet threads:

```
$my_path/bin/snort -c $my_path/etc/snort/snort.lua -R $my_path/etc/snort/sample. ↩
    rules \
     --pcap-filter \*.pcap --pcap-dir <dir> -A alert_fast -n 1000 --max-packet- ↩
        threads 8
```

For more examples, see the usage section.

2.4 Tips

One of the goals of Snort++ is to make it easier to configure your sensor. Here is a summary of tips and tricks you may find useful.

General Use

- Snort tries hard not to error out too quickly. It will report multiple semantic errors.
- Snort always assumes the simplest mode of operation. Eg, you can omit the -T option to validate the conf if you don't provide a packet source.
- Warnings are not emitted unless --warn-* is specified. --warn-all enables all warnings, and --pedantic makes such warnings fatal.
- You can process multiple sources at one time by using the -z or --max-threads option.
- To make it easy to find the important data, zero counts are not output at shutdown.
- Load plugins from the command line with --plugin-path /path/to/install/lib.
- You can process multiple sources at one time by using the -z or --max-threads option.
- Unit tests are configured with --enable-unit-tests. They can then be run with snort --catch-test [tags]|all.

Lua Configuration

- Configure the wizard and default bindings will be created based on configured inspectors. No need to explicitly bind ports in this case.
- You can override or add to your Lua conf with the --lua command line option.
- The Lua conf is a live script that is executed when loaded. You can add functions, grab environment variables, compute values, etc.
- You can also rename symbols that you want to disable. For example, changing normalizer to Xnormalizer (an unknown symbol) will disable the normalizer. This can be easier than commenting in some cases.
- By default, symbols unknown to Snort++ are silently ignored. You can generate warnings for them with --warn-unknown. To ignore such symbols, export them in the environment variable SNORT_IGNORE.

Writing and Loading Rules

Snort++ rules allow arbitrary whitespace. Multi-line rules make it easier to structure your rule for clarity. There are multiple ways to add comments to your rules:

- Like Snort, the # character starts a comment to end of line. In addition, all lines between #begin and #end are comments.
- The rem option allows you to write a comment that is conveyed with the rule.
- C style multi-line comments are allowed, which means you can comment out portions of a rule while testing it out by putting the options between /* and */.

There are multiple ways to load rules too:

- Set ips.rules or ips.include.
- Snort 2.X include statements can be used in rules files.
- Use -R to load a rules file.
- Use --stdin-rules with command line redirection.

- Use --lua to specify one or more rules as a command line argument.

Output Files

To make it simple to configure outputs when you run with multiple packet threads, output files are not explicitly configured. Instead, you can use the options below to format the paths:

```
<logdir>/[<run_prefix>][<id#>][<X>]<name>
```

- logdir is set with -l and defaults to ./
- run_prefix is set with --run-prefix else not used
- id# is the packet thread number that writes the file; with one packet thread, id# (zero) is omitted without --id-zero
- X is / if you use --id-subdir, else _ if id# is used
- name is based on module name that writes the file
- all text mode outputs default to stdout

2.5 Help

```
Snort has several options to get more help:

-? list command line options (same as --help)
--help this overview of help
--help-commands [<module prefix>] output matching commands
--help-config [<module prefix>] output matching config options
--help-counts [<module prefix>] output matching peg counts
--help-module <module> output description of given module
--help-modules list all available modules with brief help
--help-plugins list all available plugins with brief help
--help-options [<option prefix>] output matching command line options
--help-signals dump available control signals
--list-buffers output available inspection buffers
--list-builtin [<module prefix>] output matching builtin rules
--list-gids [<module prefix>] output matching generators
--list-modules [<module type>] list all known modules
--list-plugins list all known modules
--show-plugins list module and plugin versions

--help* and --list* options preempt other processing so should be last on the
command line since any following options are ignored.  To ensure options like
--markup and --plugin-path take effect, place them ahead of the help or list
options.

Options that filter output based on a matching prefix, such as --help-config
won't output anything if there is no match.  If no prefix is given, everything
matches.

Report bugs to bugs@snort.org.
```

2.6 Common Errors

FATAL: snort_config is required

- add this line near top of file:

```
require('snort_config')
```

PANIC: unprotected error in call to Lua API (cannot open snort_defaults.lua: No such file or directory)

- export SNORT_LUA_PATH to point to any dofiles

ERROR can't find xyz

- if xyz is the name of a module, make sure you are not assigning a scalar where a table is required (e.g. xyz = 2 should be xyz = { }).

ERROR can't find x.y

- module x does not have a parameter named y. check --help-module x for available parameters.

ERROR invalid x.y = z

- the value z is out of range for x.y. check --help-config x.y for the range allowed.

ERROR: x = { y = z } is in conf but is not being applied

- make sure that x = { } isn't set later because it will override the earlier setting. same for x.y.

FATAL: can't load lua/errors.lua: lua/errors.lua:68: = expected near ';'

- this is a syntax error reported by Lua to Snort on line 68 of errors.lua.

ERROR: rules(2) unknown rule keyword: find.

- this was due to not including the --script-path.

WARNING: unknown symbol x

- if you any variables, you can squelch such warnings by setting them in an environment variable SNORT_IGNORE. to ignore x, y, and z:

```
export SNORT_IGNORE="x y z"
```

2.7 Gotchas

- A nil key in a table will not caught. Neither will a nil value in a table. Neither of the following will cause errors, nor will they actually set http_server.post_depth:

```
http_server = { post_depth }
http_server = { post_depth = undefined_symbol }
```

- It is not an error to set a value multiple times. The actual value applied may not be the last in the table either. It is best to avoid such cases.

```
http_server =
{
    post_depth = 1234,
    post_depth = 4321
}
```

- Snort can't tell you the exact filename or line number of a semantic error but it will tell you the fully qualified name.
- The dump DAQ will not work with multiple threads unless you use --daq-var file=/dev/null. This will be fixed in at some point to use the Snort log directory, etc.
- Variables are currently processed in an order determined by the Lua hash table which is effectively random. That means you will need to use Lua string concatenation to ensure Snort doesn't try to use a variable before it is defined (even when it is defined ahead of use in the file):

```
-- this may fail:
MY_SERVERS = [[ 172.20.0.0/16 172.21.0.0/16 ]]
EXTERNAL_NET = '!$MY_SERVERS'

-- this will work:
MY_SERVERS = [[ 172.20.0.0/16 172.21.0.0/16 ]]
EXTERNAL_NET = '!' .. MY_SERVERS
```

- configure will use clang by default if it is installed.To compile with g instead:

```
export CXX=g++
```

- If you build with hyperscan on OS X and see:

```
dyld: Library not loaded: @rpath/libhs.4.0.dylib

when you try to run src/snort, export DYLD_LIBRARY_PATH with the path to
libhs.  You can also do:

install_name_tool -change @rpath/libhs.4.0.dylib \
    /path-to/libhs.4.0.dylib src/snort
```

2.8 Bugs

2.8.1 Build

- With cmake, make install will rebuild the docs even though when already built.
- Enabling large pcap may erroneously affect the number of packets processed from pcaps
- Enabling debug messages may erroneously affect the number of packets processed from pcaps
- g++ 4.9.2 with -O3 reports:

```
src/service_inspectors/back_orifice/back_orifice.cc:231:25: warning:
iteration 930u invokes undefined behavior [-Waggressive-loop-optimizations]
```

2.8.2 Config

- Parsing issue with IP lists. can't parse rules with $EXTERNAL_NET defined as below because or the space between ! and 10.

```
HOME_NET = [[ 10.0.17.0/24 10.0.14.0/24 10.247.0.0/16 10.246.0.0/16 ]]
EXTERNAL_NET = '! ' .. HOME_NET
```

- Multiple versions of luajit scripts are not handled correctly. The first loaded version will always be executed even though plugin manager saves the correct version.

- When using -c and -L together, the last on the command line wins (-c -L will dump; -L -c will analyze).
- Modules instantiated by command line only will not get default settings unless hard-coded. This notably applies to -A and -L options.
- --lua can only be used in addition to, not in place of, a -c config. Ideally, --lua could be used in lieu of -c.

2.8.3 Rules

- metdata:service foo; metadata:service foo; won't cause a duplicate service warning as does metadata:service foo, service foo;
- ip_proto doesn't work properly with reassembled packets so it can't be used to restrict the protocol of service rules.
- Inspector events generated while parsing TCP payload in non-IPS mode will indicate the wrong direction (ie they will be based on the ACK packet). (Same is true for Snort.)

2.8.4 snort2lua

- uricontent:"foo"; content:"bar"; → http_uri; content:"foo"; content:"bar"; (missing pkt_data)
- stream_tcp ports and protocols both go into a single binder.when; this is incorrect as the when fields are logically anded together (ie must all be true). Should create 2 separate bindings.
- There is a bug in pps_stream_tcp.cc.. when stream_tcp: is specified without any arguments, snort2lua doesn't convert it. Same for stream_udp.
- Loses the ip list delimiters [ ]; change to ( )

```
in snort.conf: var HOME_NET [A,B,C]
in snort.lua: HOME_NET = [[A B C]]
```

- Won't convert packet rules (alert tcp etc.) to service rules (alert http etc.).
- alert_fast and alert_full: output configuration includes "file = *foo.bar*", but file is a bool and you cannot specify an output file name in the configuration.
- preprocessor ports option: ports <number> not supported.

2.8.5 Runtime

- -B <mask> feature does not work. It does ordinary IP address obfuscation instead of using the mask.
- Obfuscation does not work for csv format.
- The hext DAQ will append a newline to text lines (starting with ″).
- The hext DAQ does not support embedded quotes in text lines (use hex lines as a workaround).
- Stream TCP alert squash mechanism incorrectly squashes alerts for different TCP packets.

3 Basic Modules

Internal modules which are not plugins are termed "basic". These include configuration for core processing.

3.1 active

What: configure responses

Type: basic

Configuration:

- int **active.attempts** = 0: number of TCP packets sent per response (with varying sequence numbers) { 0:20 }
- string **active.device**: use *ip* for network layer responses or *eth0* etc for link layer
- string **active.dst_mac**: use format *01:23:45:67:89:ab*
- int **active.max_responses** = 0: maximum number of responses { 0: }
- int **active.min_interval** = 255: minimum number of seconds between responses { 1: }

3.2 alerts

What: configure alerts

Type: basic

Configuration:

- bool **alerts.alert_with_interface_name** = false: include interface in alert info (fast, full, or syslog only)
- bool **alerts.default_rule_state** = true: enable or disable ips rules
- int **alerts.detection_filter_memcap** = 1048576: set available memory for filters { 0: }
- int **alerts.event_filter_memcap** = 1048576: set available memory for filters { 0: }
- string **alerts.order** = pass drop alert log: change the order of rule action application
- int **alerts.rate_filter_memcap** = 1048576: set available memory for filters { 0: }
- string **alerts.reference_net**: set the CIDR for homenet (for use with -l or -B, does NOT change $HOME_NET in IDS mode)
- bool **alerts.stateful** = false: don't alert w/o established session (note: rule action still taken)
- string **alerts.tunnel_verdicts**: let DAQ handle non-allow verdicts for GTP|Teredo|6in4|4in6 traffic

3.3 attribute_table

What: configure hosts loading

Type: basic

Configuration:

- int **attribute_table.max_hosts** = 1024: maximum number of hosts in attribute table { 32:207551 }
- int **attribute_table.max_services_per_host** = 8: maximum number of services per host entry in attribute table { 1:65535 }
- int **attribute_table.max_metadata_services** = 8: maximum number of services in rule metadata { 1:256 }

3.4 classifications

What: define rule categories with priority

Type: basic

Configuration:

- string **classifications[].name**: name used with classtype rule option
- int **classifications[].priority** = 1: default priority for class { 0: }
- string **classifications[].text**: description of class

3.5 daq

What: configure packet acquisition interface

Type: basic

Configuration:

- string **daq.dir**: directory where to search for DAQ plugins
- select **daq.mode**: set mode of operation { passive | inline | read-file }
- bool **daq.no_promisc** = false: whether to put DAQ device into promiscuous mode
- string **daq.type**: select type of DAQ
- string **daq.vars**: comma separated list of name=value DAQ-specific parameters
- int **daq.snaplen** = deflt: set snap length (same as -P) { 0:65535 }
- bool **daq.decode_data_link** = false: display the second layer header info

Peg counts:

- **daq.pcaps**: total files and interfaces processed
- **daq.received**: total packets received from DAQ
- **daq.analyzed**: total packets analyzed from DAQ
- **daq.dropped**: packets dropped
- **daq.filtered**: packets filtered out
- **daq.outstanding**: packets unprocessed
- **daq.injected**: active responses or replacements
- **daq.allow**: total allow verdicts
- **daq.block**: total block verdicts
- **daq.replace**: total replace verdicts
- **daq.whitelist**: total whitelist verdicts
- **daq.blacklist**: total blacklist verdicts
- **daq.ignore**: total ignore verdicts
- **daq.internal blacklist**: packets blacklisted internally due to lack of DAQ support
- **daq.internal whitelist**: packets whitelisted internally due to lack of DAQ support
- **daq.skipped**: packets skipped at startup
- **daq.fail open**: packets passed during initialization
- **daq.idle**: attempts to acquire from DAQ without available packets

3.6 decode

What: general decoder rules

Type: basic

Rules:

- **116:450** (decode) BAD-TRAFFIC bad IP protocol
- **116:293** (decode) two or more IP (v4 and/or v6) encapsulation layers present
- **116:459** (decode) fragment with zero length
- **116:150** (decode) bad traffic loopback IP
- **116:151** (decode) bad traffic same src/dst IP
- **116:449** (decode) BAD-TRAFFIC unassigned/reserved IP protocol
- **116:468** (decode) too many protocols present

3.7 detection

What: configure general IPS rule processing parameters

Type: basic

Configuration:

- int **detection.asn1** = 256: maximum decode nodes { 1: }
- bool **detection.pcre_enable** = true: disable pcre pattern matching
- int **detection.pcre_match_limit** = 1500: limit pcre backtracking, -1 = max, 0 = off { -1:1000000 }
- int **detection.pcre_match_limit_recursion** = 1500: limit pcre stack consumption, -1 = max, 0 = off { -1:10000 }

Peg counts:

- **detection.analyzed**: packets sent to detection
- **detection.slow searches**: non-fast pattern rule evaluations
- **detection.raw searches**: fast pattern searches in raw packet data
- **detection.cooked searches**: fast pattern searches in cooked packet data
- **detection.pkt searches**: fast pattern searches in packet data
- **detection.alt searches**: alt fast pattern searches in packet data
- **detection.key searches**: fast pattern searches in key buffer
- **detection.header searches**: fast pattern searches in header buffer
- **detection.body searches**: fast pattern searches in body buffer
- **detection.file searches**: fast pattern searches in file buffer
- **detection.alerts**: alerts not including IP reputation
- **detection.total alerts**: alerts including IP reputation
- **detection.logged**: logged packets

- **detection.passed**: passed packets
- **detection.match limit**: fast pattern matches not processed
- **detection.queue limit**: events not queued because queue full
- **detection.log limit**: events queued but not logged
- **detection.event limit**: events filtered
- **detection.alert limit**: events previously triggered on same PDU

3.8 event_filter

What: configure thresholding of events

Type: basic

Configuration:

- int **event_filter[].gid** = 1: rule generator ID { 0: }
- int **event_filter[].sid** = 1: rule signature ID { 0: }
- enum **event_filter[].type**: 1st count events | every count events | once after count events { limit | threshold | both }
- enum **event_filter[].track**: filter only matching source or destination addresses { by_src | by_dst }
- int **event_filter[].count** = 0: number of events in interval before tripping; -1 to disable { -1: }
- int **event_filter[].seconds** = 0: count interval { 0: }
- string **event_filter[].ip**: restrict filter to these addresses according to track

3.9 event_queue

What: configure event queue parameters

Type: basic

Configuration:

- int **event_queue.max_queue** = 8: maximum events to queue { 1: }
- int **event_queue.log** = 3: maximum events to log { 1: }
- enum **event_queue.order_events** = content_length: criteria for ordering incoming events { priority|content_length }
- bool **event_queue.process_all_events** = false: process just first action group or all action groups

3.10 file_id

What: configure file identification

Type: basic

Configuration:

- int **file_id.type_depth** = 1460: stop type ID at this point { 0: }
- int **file_id.signature_depth** = 10485760: stop signature at this point { 0: }
- int **file_id.block_timeout** = 86400: stop blocking after this many seconds { 0: }

- int **file_id.lookup_timeout** = 2: give up on lookup after this many seconds { 0: }
- bool **file_id.block_timeout_lookup** = false: block if lookup times out
- bool **file_id.enable_type** = false: enable type ID
- bool **file_id.enable_signature** = false: enable signature calculation
- bool **file_id.enable_capture** = false: enable file capture
- int **file_id.show_data_depth** = 100: print this many octets { 0: }
- int **file_id.file_rules[].rev** = 0: rule revision { 0: }
- string **file_id.file_rules[].msg**: information about the file type
- string **file_id.file_rules[].type**: file type name
- int **file_id.file_rules[].id** = 0: file type id { 0: }
- string **file_id.file_rules[].category**: file type category
- string **file_id.file_rules[].version**: file type version
- string **file_id.file_rules[].magic[].content**: file magic content
- int **file_id.file_rules[].magic[].offset** = 0: file magic offset { 0: }
- int **file_id.file_policy[].when.file_type_id** = 0: unique ID for file type in file magic rule { 0: }
- string **file_id.file_policy[].when.sha256**: SHA 256
- enum **file_id.file_policy[].use.verdict** = unknown: what to do with matching traffic { unknown | log | stop | block | reset }
- bool **file_id.file_policy[].use.enable_file_type** = false: true/false → enable/disable file type identification
- bool **file_id.file_policy[].use.enable_file_signature** = false: true/false → enable/disable file signature
- bool **file_id.file_policy[].use.enable_file_capture** = false: true/false → enable/disable file capture
- bool **file_id.trace_type** = false: enable runtime dump of type info
- bool **file_id.trace_signature** = false: enable runtime dump of signature info
- bool **file_id.trace_stream** = false: enable runtime dump of file data

3.11 hosts

What: configure hosts

Type: basic

Configuration:

- addr **hosts[].ip** = 0.0.0.0/32: hosts address / cidr
- enum **hosts[].frag_policy**: defragmentation policy { first | linux | bsd | bsd_right | last | windows | solaris }
- enum **hosts[].tcp_policy**: tcp reassembly policy { first | last | linux | old_linux | bsd | macos | solaris | irix | hpux11 | hpux10 | windows | win_2003 | vista | proxy }
- string **hosts[].services[].name**: service identifier
- enum **hosts[].services[].proto** = tcp: ip protocol { tcp | udp }
- port **hosts[].services[].port**: port number

3.12 ips

What: configure IPS rule processing

Type: basic

Configuration:

- bool **ips.enable_builtin_rules** = false: enable events from builtin rules w/o stubs
- int **ips.id** = 0: correlate unified2 events with configuration { 0:65535 }
- string **ips.include**: legacy snort rules and includes
- enum **ips.mode**: set policy mode { tap | inline | inline-test }
- string **ips.rules**: snort rules and includes

3.13 network

What: configure basic network parameters

Type: basic

Configuration:

- multi **network.checksum_drop** = none: drop if checksum is bad { all | ip | noip | tcp | notcp | udp | noudp | icmp | noicmp | none }
- multi **network.checksum_eval** = none: checksums to verify { all | ip | noip | tcp | notcp | udp | noudp | icmp | noicmp | none }
- bool **network.decode_drops** = false: enable dropping of packets by the decoder
- int **network.id** = 0: correlate unified2 events with configuration { 0:65535 }
- int **network.min_ttl** = 1: alert / normalize packets with lower ttl / hop limit (you must enable rules and / or normalization also) { 1:255 }
- int **network.new_ttl** = 1: use this value for responses and when normalizing { 1:255 }
- int **network.layers** = 40: The maximum number of protocols that Snort can correctly decode { 3:255 }
- int **network.max_ip6_extensions** = 0: The number of IP6 options Snort will process for a given IPv6 layer. If this limit is hit, rule 116:456 may fire. 0 = unlimited { 0:255 }
- int **network.max_ip_layers** = 0: The maximum number of IP layers Snort will process for a given packet If this limit is hit, rule 116:293 may fire. 0 = unlimited { 0:255 }

3.14 output

What: configure general output parameters

Type: basic

Configuration:

- bool **output.dump_chars_only** = false: turns on character dumps (same as -C)
- bool **output.dump_payload** = false: dumps application layer (same as -d)
- bool **output.dump_payload_verbose** = false: dumps raw packet starting at link layer (same as -X)
- bool **output.log_ipv6_extra_data** = false: log IPv6 source and destination addresses as unified2 extra data records

- int **output.event_trace.max_data** = 0: maximum amount of packet data to capture { 0:65535 }
- bool **output.quiet** = false: suppress non-fatal information (still show alerts, same as -q)
- string **output.logdir** = .: where to put log files (same as -l)
- bool **output.obfuscate** = false: obfuscate the logged IP addresses (same as -O)
- bool **output.show_year** = false: include year in timestamp in the alert and log files (same as -y)
- int **output.tagged_packet_limit** = 256: maximum number of packets tagged for non-packet metrics { 0: }
- bool **output.verbose** = false: be verbose (same as -v)

3.15 packets

What: configure basic packet handling

Type: basic

Configuration:

- bool **packets.address_space_agnostic** = false: determines whether DAQ address space info is used to track fragments and connections
- string **packets.bpf_file**: file with BPF to select traffic for Snort
- bool **packets.enable_inline_init_failopen** = true: whether to pass traffic during later stage of initialization to avoid drops
- int **packets.limit** = 0: maximum number of packets to process before stopping (0 is unlimited) { 0: }
- int **packets.skip** = 0: number of packets to skip before before processing { 0: }
- bool **packets.vlan_agnostic** = false: determines whether VLAN info is used to track fragments and connections

3.16 process

What: configure basic process setup

Type: basic

Configuration:

- string **process.chroot**: set chroot directory (same as -t)
- int **process.threads[].cpu** = 0: pin the associated source/thread to this cpu { 0:127 }
- string **process.threads[].source**: set cpu affinity for this source (either pcap or <iface>
- int **process.threads[].thread** = 0: set cpu affinity for the <cur_thread_num> thread that runs { 0: }
- bool **process.daemon** = false: fork as a daemon (same as -D)
- bool **process.dirty_pig** = false: shutdown without internal cleanup
- string **process.set_gid**: set group ID (same as -g)
- string **process.set_uid**: set user ID (same as -u)
- string **process.umask**: set process umask (same as -m)
- bool **process.utc** = false: use UTC instead of local time for timestamps

3.17 profiler

What: configure profiling of rules and/or modules

Type: basic

Configuration:

- bool **profiler.modules.show** = true: show module time profile stats
- int **profiler.modules.count** = 0: print results to given level (0 = all) { 0: }
- enum **profiler.modules.sort** = total_time: sort by given field { none | checks | avg_check | total_time }
- bool **profiler.memory.show** = true: show module memory profile stats
- int **profiler.memory.count** = 0: print results to given level (0 = all) { 0: }
- enum **profiler.memory.sort** = total_used: sort by given field { none | allocations | total_used | avg_allocation }
- bool **profiler.rules.show** = true: show rule time profile stats
- int **profiler.rules.count** = 0: print results to given level (0 = all) { 0: }
- enum **profiler.rules.sort** = total_time: sort by given field { none | checks | avg_check | total_time | matches | no_matches | avg_match | avg_no_match }

3.18 rate_filter

What: configure rate filters (which change rule actions)

Type: basic

Configuration:

- int **rate_filter[].gid** = 1: rule generator ID { 0: }
- int **rate_filter[].sid** = 1: rule signature ID { 0: }
- enum **rate_filter[].track** = by_src: filter only matching source or destination addresses { by_src | by_dst | by_rule }
- int **rate_filter[].count** = 1: number of events in interval before tripping { 0: }
- int **rate_filter[].seconds** = 1: count interval { 0: }
- select **rate_filter[].new_action** = alert: take this action on future hits until timeout { alert | drop | log | pass | | reject | sdrop }
- int **rate_filter[].timeout** = 1: count interval { 0: }
- string **rate_filter[].apply_to**: restrict filter to these addresses according to track

3.19 references

What: define reference systems used in rules

Type: basic

Configuration:

- string **references[].name**: name used with reference rule option
- string **references[].url**: where this reference is defined

3.20 rule_state

What: enable/disable specific IPS rules

Type: basic

Configuration:

- int **rule_state.gid** = 0: rule generator ID { 0: }
- int **rule_state.sid** = 0: rule signature ID { 0: }
- bool **rule_state.enable** = true: enable or disable rule in all policies

3.21 search_engine

What: configure fast pattern matcher

Type: basic

Configuration:

- int **search_engine.bleedover_port_limit** = 1024: maximum ports in rule before demotion to any-any port group { 1: }
- bool **search_engine.bleedover_warnings_enabled** = false: print warning if a rule is demoted to any-any port group
- bool **search_engine.enable_single_rule_group** = false: put all rules into one group
- bool **search_engine.debug** = false: print verbose fast pattern info
- bool **search_engine.debug_print_nocontent_rule_tests** = false: print rule group info during packet evaluation
- bool **search_engine.debug_print_rule_group_build_details** = false: print rule group info during compilation
- bool **search_engine.debug_print_rule_groups_uncompiled** = false: prints uncompiled rule group information
- bool **search_engine.debug_print_rule_groups_compiled** = false: prints compiled rule group information
- bool **search_engine.debug_print_fast_pattern** = false: print fast pattern info for each rule
- int **search_engine.max_pattern_len** = 0: truncate patterns when compiling into state machine (0 means no maximum) { 0: }
- int **search_engine.max_queue_events** = 5: maximum number of matching fast pattern states to queue per packet
- bool **search_engine.inspect_stream_inserts** = false: inspect reassembled payload - disabling is good for performance, bad for detection
- dynamic **search_engine.search_method** = ac_bnfa: set fast pattern algorithm - choose available search engine { ac_banded | ac_bnfa | ac_full | ac_sparse | ac_sparse_bands | ac_std | hyperscan }
- bool **search_engine.split_any_any** = false: evaluate any-any rules separately to save memory
- bool **search_engine.search_optimize** = false: tweak state machine construction for better performance

3.22 snort

What: command line configuration

Type: basic

Configuration:

- string **snort.-?**: <option prefix> output matching command line option quick help (same as --help-options) { (optional) }
- string **snort.-A**: <mode> set alert mode: none, cmg, or alert_*
- addr **snort.-B** = 255.255.255.255/32: <mask> obfuscated IP addresses in alerts and packet dumps using CIDR mask
- implied **snort.-C**: print out payloads with character data only (no hex)
- string **snort.-c**: <conf> use this configuration
- implied **snort.-D**: run Snort in background (daemon) mode
- implied **snort.-d**: dump the Application Layer
- implied **snort.-e**: display the second layer header info
- implied **snort.-f**: turn off fflush() calls after binary log writes
- int **snort.-G**: <0xid> (same as --logid) { 0:65535 }
- string **snort.-g**: <gname> run snort gid as <gname> group (or gid) after initialization
- implied **snort.-H**: make hash tables deterministic
- string **snort.-i**: <iface>... list of interfaces
- enum **snort.-k** = all: <mode> checksum mode; default is all { all|noip|notcp|noudp|noicmp|none }
- string **snort.-L**: <mode> logging mode (none, dump, pcap, or log_*)
- string **snort.-l**: <logdir> log to this directory instead of current directory
- implied **snort.-M**: log messages to syslog (not alerts)
- int **snort.-m**: <umask> set umask = <umask> { 0: }
- int **snort.-n**: <count> stop after count packets { 0: }
- implied **snort.-O**: obfuscate the logged IP addresses
- implied **snort.-Q**: enable inline mode operation
- implied **snort.-q**: quiet mode - Don't show banner and status report
- string **snort.-R**: <rules> include this rules file in the default policy
- string **snort.-r**: <pcap>... (same as --pcap-list)
- string **snort.-S**: <x=v> set config variable x equal to value v
- int **snort.-s** = 1514: <snap> (same as --snaplen); default is 1514 { 68:65535 }
- implied **snort.-T**: test and report on the current Snort configuration
- string **snort.-t**: <dir> chroots process to <dir> after initialization
- implied **snort.-U**: use UTC for timestamps
- string **snort.-u**: <uname> run snort as <uname> or <uid> after initialization

- implied **snort.-V**: (same as --version)
- implied **snort.-v**: be verbose
- implied **snort.-W**: lists available interfaces
- implied **snort.-w**: dump 802.11 management and control frames
- implied **snort.-X**: dump the raw packet data starting at the link layer
- implied **snort.-x**: same as --pedantic
- implied **snort.-y**: include year in timestamp in the alert and log files
- int **snort.-z** = 1: <count> maximum number of packet threads (same as --max-packet-threads); 0 gets the number of CPU cores reported by the system; default is 1 { 0: }
- implied **snort.--alert-before-pass**: process alert, drop, sdrop, or reject before pass; default is pass before alert, drop,...
- string **snort.--bpf**: <filter options> are standard BPF options, as seen in TCPDump
- string **snort.--c2x**: output hex for given char (see also --x2c)
- implied **snort.--create-pidfile**: create PID file, even when not in Daemon mode
- string **snort.--daq**: <type> select packet acquisition module (default is pcap)
- string **snort.--daq-dir**: <dir> tell snort where to find desired DAQ
- implied **snort.--daq-list**: list packet acquisition modules available in optional dir, default is static modules only
- string **snort.--daq-mode**: <mode> select the DAQ operating mode
- string **snort.--daq-var**: <name=value> specify extra DAQ configuration variable
- implied **snort.--dirty-pig**: don't flush packets on shutdown
- implied **snort.--dump-builtin-rules**: [<module prefix>] output stub rules for selected modules
- implied **snort.--dump-dynamic-rules**: output stub rules for all loaded rules libraries
- string **snort.--dump-defaults**: [<module prefix>] output module defaults in Lua format { (optional) }
- string **snort.--dump-version**: output the version, the whole version, and only the version { (optional) }
- implied **snort.--enable-inline-test**: enable Inline-Test Mode Operation
- implied **snort.--help**: list command line options
- string **snort.--help-commands**: [<module prefix>] output matching commands { (optional) }
- string **snort.--help-config**: [<module prefix>] output matching config options { (optional) }
- string **snort.--help-counts**: [<module prefix>] output matching peg counts { (optional) }
- string **snort.--help-module**: <module> output description of given module
- implied **snort.--help-modules**: list all available modules with brief help
- string **snort.--help-options**: <option prefix> output matching command line option quick help (same as -?) { (optional) }
- implied **snort.--help-plugins**: list all available plugins with brief help
- implied **snort.--help-signals**: dump available control signals
- implied **snort.--id-subdir**: create/use instance subdirectories in logdir instead of instance filename prefix
- implied **snort.--id-zero**: use id prefix / subdirectory even with one packet thread

- implied **snort.--list-buffers**: output available inspection buffers
- string **snort.--list-builtin**: <module prefix> output matching builtin rules { (optional) }
- string **snort.--list-gids**: [<module prefix>] output matching generators { (optional) }
- string **snort.--list-modules**: [<module type>] list all known modules of given type { (optional) }
- implied **snort.--list-plugins**: list all known plugins
- string **snort.--lua**: <chunk> extend/override conf with chunk; may be repeated
- int **snort.--logid**: <0xid> log Identifier to uniquely id events for multiple snorts (same as -G) { 0:65535 }
- implied **snort.--markup**: output help in asciidoc compatible format
- int **snort.--max-packet-threads** = 1: <count> configure maximum number of packet threads (same as -z) { 0: }
- implied **snort.--nostamps**: don't include timestamps in log file names
- implied **snort.--nolock-pidfile**: do not try to lock Snort PID file
- implied **snort.--pause**: wait for resume/quit command before processing packets/terminating
- string **snort.--pcap-file**: <file> file that contains a list of pcaps to read - read mode is implied
- string **snort.--pcap-list**: <list> a space separated list of pcaps to read - read mode is implied
- string **snort.--pcap-dir**: <dir> a directory to recurse to look for pcaps - read mode is implied
- string **snort.--pcap-filter**: <filter> filter to apply when getting pcaps from file or directory
- int **snort.--pcap-loop**: <count> read all pcaps <count> times; 0 will read until Snort is terminated { -1: }
- implied **snort.--pcap-no-filter**: reset to use no filter when getting pcaps from file or directory
- implied **snort.--pcap-reload**: if reading multiple pcaps, reload snort config between pcaps
- implied **snort.--pcap-show**: print a line saying what pcap is currently being read
- implied **snort.--pedantic**: warnings are fatal
- string **snort.--plugin-path**: <path> where to find plugins
- implied **snort.--process-all-events**: process all action groups
- string **snort.--rule**: <rules> to be added to configuration; may be repeated
- implied **snort.--rule-to-hex**: output so rule header to stdout for text rule on stdin
- implied **snort.--rule-to-text**: output plain so rule header to stdout for text rule on stdin
- string **snort.--run-prefix**: <pfx> prepend this to each output file
- string **snort.--script-path**: <path> to a luajit script or directory containing luajit scripts
- implied **snort.--show-plugins**: list module and plugin versions
- int **snort.--skip**: <n> skip 1st n packets { 0: }
- int **snort.--snaplen** = 1514: <snap> set snaplen of packet (same as -s) { 68:65535 }
- implied **snort.--stdin-rules**: read rules from stdin until EOF or a line starting with END is read
- implied **snort.--treat-drop-as-alert**: converts drop, sdrop, and reject rules into alert rules during startup
- implied **snort.--treat-drop-as-ignore**: use drop, sdrop, and reject rules to ignore session traffic when not inline
- implied **snort.--version**: show version number (same as -V)

- implied **snort.--warn-all**: enable all warnings
- implied **snort.--warn-conf**: warn about configuration issues
- implied **snort.--warn-daq**: warn about DAQ issues, usually related to mode
- implied **snort.--warn-flowbits**: warn about flowbits that are checked but not set and vice-versa
- implied **snort.--warn-hosts**: warn about host table issues
- implied **snort.--warn-plugins**: warn about issues that prevent plugins from loading
- implied **snort.--warn-rules**: warn about duplicate rules and rule parsing issues
- implied **snort.--warn-scripts**: warn about issues discovered while processing Lua scripts
- implied **snort.--warn-symbols**: warn about unknown symbols in your Lua config
- implied **snort.--warn-vars**: warn about variable definition and usage issues
- int **snort.--x2c**: output ASCII char for given hex (see also --c2x)
- string **snort.--x2s**: output ASCII string for given byte code (see also --x2c)

Peg counts:

- **snort.local commands**: total local commands processed
- **snort.remote commands**: total remote commands processed
- **snort.signals**: total signals processed
- **snort.conf reloads**: number of times configuration was reloaded
- **snort.attribute table reloads**: number of times hosts table was reloaded
- **snort.attribute table hosts**: total number of hosts in table

3.23 suppress

What: configure event suppressions

Type: basic

Configuration:

- int **suppress[].gid** = 0: rule generator ID { 0: }
- int **suppress[].sid** = 0: rule signature ID { 0: }
- enum **suppress[].track**: suppress only matching source or destination addresses { by_src | by_dst }
- string **suppress[].ip**: restrict suppression to these addresses according to track

4 Codec Modules

Codec is short for coder / decoder. These modules are used for basic protocol decoding, anomaly detection, and construction of active responses.

4.1 arp

What: support for address resolution protocol

Type: codec

Rules:

- **116:109** (arp) truncated ARP

4.2 auth

What: support for IP authentication header

Type: codec

Rules:

- **116:465** (auth) truncated authentication header
- **116:466** (auth) bad authentication header length

4.3 eapol

What: support for extensible authentication protocol over LAN

Type: codec

Rules:

- **116:110** (eapol) truncated EAP header
- **116:111** (eapol) EAP key truncated
- **116:112** (eapol) EAP header truncated

4.4 erspan2

What: support for encapsulated remote switched port analyzer - type 2

Type: codec

Rules:

- **116:462** (erspan2) ERSpan header version mismatch
- **116:463** (erspan2) captured < ERSpan type2 header length

4.5 erspan3

What: support for encapsulated remote switched port analyzer - type 3

Type: codec

Rules:

- **116:464** (erspan3) captured < ERSpan type3 header length

4.6 esp

What: support for encapsulating security payload

Type: codec

Configuration:

- bool **esp.decode_esp** = false: enable for inspection of esp traffic that has authentication but not encryption

Rules:

- **116:294** (esp) truncated encapsulated security payload header

4.7 eth

What: support for ethernet protocol (DLT 1) (DLT 51)

Type: codec

Rules:

- **116:424** (eth) truncated eth header

4.8 fabricpath

What: support for fabricpath

Type: codec

Rules:

- **116:467** (fabricpath) truncated FabricPath header

4.9 gre

What: support for generic routing encapsulation

Type: codec

Rules:

- **116:160** (gre) GRE header length > payload length
- **116:161** (gre) multiple encapsulations in packet
- **116:162** (gre) invalid GRE version
- **116:163** (gre) invalid GRE header
- **116:164** (gre) invalid GRE v.1 PPTP header
- **116:165** (gre) GRE trans header length > payload length

4.10 gtp

What: support for general-packet-radio-service tunnelling protocol

Type: codec

Rules:

- **116:297** (gtp) two or more GTP encapsulation layers present
- **116:298** (gtp) GTP header length is invalid

4.11 icmp4

What: support for Internet control message protocol v4

Type: codec

Rules:

- **116:105** (icmp4) ICMP header truncated
- **116:106** (icmp4) ICMP timestamp header truncated
- **116:107** (icmp4) ICMP address header truncated
- **116:250** (icmp4) ICMP original IP header truncated
- **116:251** (icmp4) ICMP version and original IP header versions differ
- **116:252** (icmp4) ICMP original datagram length < original IP header length
- **116:253** (icmp4) ICMP original IP payload < 64 bits
- **116:254** (icmp4) ICMP original IP payload > 576 bytes
- **116:255** (icmp4) ICMP original IP fragmented and offset not 0
- **116:415** (icmp4) ICMP4 packet to multicast dest address
- **116:416** (icmp4) ICMP4 packet to broadcast dest address
- **116:418** (icmp4) ICMP4 type other
- **116:434** (icmp4) ICMP ping NMAP
- **116:435** (icmp4) ICMP icmpenum v1.1.1
- **116:436** (icmp4) ICMP redirect host
- **116:437** (icmp4) ICMP redirect net
- **116:438** (icmp4) ICMP traceroute ipopts
- **116:439** (icmp4) ICMP source quench
- **116:440** (icmp4) broadscan smurf scanner
- **116:441** (icmp4) ICMP destination unreachable communication administratively prohibited
- **116:442** (icmp4) ICMP destination unreachable communication with destination host is administratively prohibited
- **116:443** (icmp4) ICMP destination unreachable communication with destination network is administratively prohibited
- **116:451** (icmp4) ICMP path MTU denial of service attempt
- **116:452** (icmp4) BAD-TRAFFIC Linux ICMP header DOS attempt
- **116:426** (icmp4) truncated ICMP4 header

Peg counts:

- **icmp4.bad checksum**: non-zero icmp checksums

4.12 icmp6

What: support for Internet control message protocol v6

Type: codec

Rules:

- **116:427** (icmp6) truncated ICMP6 header
- **116:431** (icmp6) ICMP6 type not decoded
- **116:432** (icmp6) ICMP6 packet to multicast address
- **116:285** (icmp6) ICMPv6 packet of type 2 (message too big) with MTU field < 1280
- **116:286** (icmp6) ICMPv6 packet of type 1 (destination unreachable) with non-RFC 2463 code
- **116:287** (icmp6) ICMPv6 router solicitation packet with a code not equal to 0
- **116:288** (icmp6) ICMPv6 router advertisement packet with a code not equal to 0
- **116:289** (icmp6) ICMPv6 router solicitation packet with the reserved field not equal to 0
- **116:290** (icmp6) ICMPv6 router advertisement packet with the reachable time field set > 1 hour
- **116:457** (icmp6) ICMPv6 packet of type 1 (destination unreachable) with non-RFC 4443 code
- **116:460** (icmp6) ICMPv6 node info query/response packet with a code greater than 2

Peg counts:

- **icmp6.bad checksum (ip4)**: nonzero ipcm4 checksums
- **icmp6.bad checksum (ip6)**: nonzero ipcm6 checksums

4.13 igmp

What: support for Internet group management protocol

Type: codec

Rules:

- **116:455** (igmp) DOS IGMP IP options validation attempt

4.14 ipv4

What: support for Internet protocol v4

Type: codec

Rules:

- **116:1** (ipv4) Not IPv4 datagram
- **116:2** (ipv4) hlen < minimum
- **116:3** (ipv4) IP dgm len < IP Hdr len
- **116:4** (ipv4) Ipv4 Options found with bad lengths
- **116:5** (ipv4) Truncated Ipv4 Options

- **116:6** (ipv4) IP dgm len > captured len
- **116:404** (ipv4) IPV4 packet with zero TTL
- **116:405** (ipv4) IPV4 packet with bad frag bits (both MF and DF set)
- **116:407** (ipv4) IPV4 packet frag offset + length exceed maximum
- **116:408** (ipv4) IPV4 packet from *current net* source address
- **116:409** (ipv4) IPV4 packet to *current net* dest address
- **116:410** (ipv4) IPV4 packet from multicast source address
- **116:411** (ipv4) IPV4 packet from reserved source address
- **116:412** (ipv4) IPV4 packet to reserved dest address
- **116:413** (ipv4) IPV4 packet from broadcast source address
- **116:414** (ipv4) IPV4 packet to broadcast dest address
- **116:428** (ipv4) IPV4 packet below TTL limit
- **116:430** (ipv4) IPV4 packet both DF and offset set
- **116:448** (ipv4) BAD-TRAFFIC IP reserved bit set
- **116:444** (ipv4) MISC IP option set
- **116:425** (ipv4) truncated IP4 header

Peg counts:

- **ipv4.bad checksum**: nonzero ip checksums

4.15 ipv6

What: support for Internet protocol v6

Type: codec

Rules:

- **116:270** (ipv6) IPv6 packet below TTL limit
- **116:271** (ipv6) IPv6 header claims to not be IPv6
- **116:272** (ipv6) IPV6 truncated extension header
- **116:273** (ipv6) IPV6 truncated header
- **116:274** (ipv6) IP dgm len < IP Hdr len
- **116:275** (ipv6) IP dgm len > captured len
- **116:276** (ipv6) IPv6 packet with destination address ::0
- **116:277** (ipv6) IPv6 packet with multicast source address
- **116:278** (ipv6) IPv6 packet with reserved multicast destination address
- **116:279** (ipv6) IPv6 header includes an undefined option type
- **116:280** (ipv6) IPv6 address includes an unassigned multicast scope value

- **116:281** (ipv6) IPv6 header includes an invalid value for the *next header* field
- **116:282** (ipv6) IPv6 header includes a routing extension header followed by a hop-by-hop header
- **116:283** (ipv6) IPv6 header includes two routing extension headers
- **116:292** (ipv6) IPv6 header has destination options followed by a routing header
- **116:291** (ipv6) IPV6 tunneled over IPv4, IPv6 header truncated, possible Linux kernel attack
- **116:295** (ipv6) IPv6 header includes an option which is too big for the containing header
- **116:296** (ipv6) IPv6 packet includes out-of-order extension headers
- **116:429** (ipv6) IPV6 packet has zero hop limit
- **116:453** (ipv6) BAD-TRAFFIC ISATAP-addressed IPv6 traffic spoofing attempt
- **116:458** (ipv6) bogus fragmentation packet, possible BSD attack
- **116:461** (ipv6) IPV6 routing type 0 extension header
- **116:456** (ipv6) too many IP6 extension headers

4.16 mpls

What: support for multiprotocol label switching

Type: codec

Configuration:

- bool **mpls.enable_mpls_multicast** = false: enables support for MPLS multicast
- bool **mpls.enable_mpls_overlapping_ip** = false: enable if private network addresses overlap and must be differentiated by MPLS label(s)
- int **mpls.max_mpls_stack_depth** = -1: set MPLS stack depth { -1: }
- enum **mpls.mpls_payload_type** = ip4: set encapsulated payload type { eth | ip4 | ip6 }

Rules:

- **116:170** (mpls) bad MPLS frame
- **116:171** (mpls) MPLS label 0 appears in non-bottom header
- **116:172** (mpls) MPLS label 1 appears in bottom header
- **116:173** (mpls) MPLS label 2 appears in non-bottom header
- **116:174** (mpls) MPLS label 3 appears in header
- **116:175** (mpls) MPLS label 4, 5,.. or 15 appears in header
- **116:176** (mpls) too many MPLS headers

4.17 pgm

What: support for pragmatic general multicast

Type: codec

Rules:

- **116:454** (pgm) BAD-TRAFFIC PGM nak list overflow attempt

4.18 pppoe

What: support for point-to-point protocol over ethernet

Type: codec

Rules:

- **116:120** (pppoe) bad PPPOE frame detected

4.19 tcp

What: support for transmission control protocol

Type: codec

Rules:

- **116:45** (tcp) TCP packet len is smaller than 20 bytes
- **116:46** (tcp) TCP data offset is less than 5
- **116:47** (tcp) TCP header length exceeds packet length
- **116:54** (tcp) TCP options found with bad lengths
- **116:55** (tcp) truncated TCP options
- **116:56** (tcp) T/TCP detected
- **116:57** (tcp) obsolete TCP options found
- **116:58** (tcp) experimental TCP options found
- **116:59** (tcp) TCP window scale option found with length > 14
- **116:400** (tcp) XMAS attack detected
- **116:401** (tcp) Nmap XMAS attack detected
- **116:419** (tcp) TCP urgent pointer exceeds payload length or no payload
- **116:420** (tcp) TCP SYN with FIN
- **116:421** (tcp) TCP SYN with RST
- **116:422** (tcp) TCP PDU missing ack for established session
- **116:423** (tcp) TCP has no SYN, ACK, or RST
- **116:433** (tcp) DDOS shaft SYN flood
- **116:446** (tcp) BAD-TRAFFIC TCP port 0 traffic
- **116:402** (tcp) DOS NAPTHA vulnerability detected
- **116:403** (tcp) bad traffic SYN to multicast address

Peg counts:

- **tcp.bad checksum (ip4)**: nonzero tcp over ip checksums
- **tcp.bad checksum (ip6)**: nonzero tcp over ipv6 checksums

4.20 token_ring

What: support for token ring decoding

Type: codec

Rules:

- **116:140** (token_ring) (token_ring) Bad Token Ring Header
- **116:141** (token_ring) (token_ring) Bad Token Ring ETHLLC Header
- **116:142** (token_ring) (token_ring) Bad Token Ring MRLENHeader
- **116:143** (token_ring) (token_ring) Bad Token Ring MR Header

4.21 udp

What: support for user datagram protocol

Type: codec

Configuration:

- bool **udp.deep_teredo_inspection** = false: look for Teredo on all UDP ports (default is only 3544)
- bool **udp.enable_gtp** = false: decode GTP encapsulations
- bit_list **udp.gtp_ports** = 2152 3386: set GTP ports { 65535 }

Rules:

- **116:95** (udp) truncated UDP header
- **116:96** (udp) invalid UDP header, length field < 8
- **116:97** (udp) short UDP packet, length field > payload length
- **116:98** (udp) long UDP packet, length field < payload length
- **116:406** (udp) invalid IPv6 UDP packet, checksum zero
- **116:445** (udp) misc large UDP Packet
- **116:447** (udp) BAD-TRAFFIC UDP port 0 traffic

Peg counts:

- **udp.bad checksum (ip4)**: nonzero udp over ipv4 checksums
- **udp.bad checksum (ip6)**: nonzero udp over ipv6 checksums

4.22 vlan

What: support for local area network

Type: codec

Rules:

- **116:130** (vlan) bad VLAN frame
- **116:131** (vlan) bad LLC header
- **116:132** (vlan) bad extra LLC info

4.23 wlan

What: support for wireless local area network protocol (DLT 105)

Type: codec

Rules:

- **116:133** (wlan) bad 802.11 LLC header
- **116:134** (wlan) bad 802.11 extra LLC info

5 Inspector Modules

These modules perform a variety of functions, including analysis of protocols beyond basic decoding.

5.1 arp_spoof

What: detect ARP attacks and anomalies

Type: inspector

Configuration:

- ip4 **arp_spoof.hosts[].ip**: host ip address
- mac **arp_spoof.hosts[].mac**: host mac address

Rules:

- **112:1** (arp_spoof) unicast ARP request
- **112:2** (arp_spoof) ethernet/ARP mismatch request for source
- **112:3** (arp_spoof) ethernet/ARP mismatch request for destination
- **112:4** (arp_spoof) attempted ARP cache overwrite attack

Peg counts:

- **arp_spoof.packets**: total packets

5.2 back_orifice

What: back orifice detection

Type: inspector

Rules:

- **105:1** (back_orifice) BO traffic detected
- **105:2** (back_orifice) BO client traffic detected
- **105:3** (back_orifice) BO server traffic detected
- **105:4** (back_orifice) BO Snort buffer attack

Peg counts:

- **back_orifice.packets**: total packets

5.3 binder

What: configure processing based on CIDRs, ports, services, etc.

Type: inspector

Configuration:

- int **binder[].when.policy_id** = 0: unique ID for selection of this config by external logic { 0: }
- bit_list **binder[].when.ifaces**: list of interface indices { 255 }
- bit_list **binder[].when.vlans**: list of VLAN IDs { 4095 }
- addr_list **binder[].when.nets**: list of networks
- enum **binder[].when.proto**: protocol { any | ip | icmp | tcp | udp | user | file }
- bit_list **binder[].when.ports**: list of ports { 65535 }
- enum **binder[].when.role** = any: use the given configuration on one or any end of a session { client | server | any }
- string **binder[].when.service**: override default configuration
- enum **binder[].use.action** = inspect: what to do with matching traffic { reset | block | allow | inspect }
- string **binder[].use.file**: use configuration in given file
- string **binder[].use.service**: override automatic service identification
- string **binder[].use.type**: select module for binding
- string **binder[].use.name**: symbol name (defaults to type)

Peg counts:

- **binder.packets**: initial bindings
- **binder.resets**: reset bindings
- **binder.blocks**: block bindings
- **binder.allows**: allow bindings
- **binder.inspects**: inspect bindings

5.4 data_log

What: log selected published data to data.log

Type: inspector

Configuration:

- string **data_log.key** = http_uri: name of data buffer to log

Peg counts:

- **data_log.packets**: total packets

5.5 dnp3

What: dnp3 inspection

Type: inspector

Configuration:

- bool **dnp3.check_crc** = false: validate checksums in DNP3 link layer frames

Rules:

- **145:1** (dnp3) DNP3 Link-Layer Frame contains bad CRC.
- **145:2** (dnp3) DNP3 Link-Layer Frame was dropped.
- **145:3** (dnp3) DNP3 Transport-Layer Segment was dropped during reassembly.
- **145:4** (dnp3) DNP3 Reassembly Buffer was cleared without reassembling a complete message.
- **145:5** (dnp3) DNP3 Link-Layer Frame uses a reserved address.
- **145:6** (dnp3) DNP3 Application-Layer Fragment uses a reserved function code.

Peg counts:

- **dnp3.total packets**: total packets
- **dnp3.udp packets**: total udp packets
- **dnp3.tcp pdus**: total tcp pdus
- **dnp3.dnp3 link layer frames**: total dnp3 link layer frames
- **dnp3.dnp3 application pdus**: total dnp3 application pdus

5.6 dns

What: dns inspection

Type: inspector

Rules:

- **131:1** (dns) Obsolete DNS RR Types
- **131:2** (dns) Experimental DNS RR Types
- **131:3** (dns) DNS Client rdata txt Overflow

Peg counts:

- **dns.packets**: total packets processed
- **dns.requests**: total dns requests
- **dns.responses**: total dns responses

5.7 dpx

What: dynamic inspector example

Type: inspector

Configuration:

- port **dpx.port**: port to check
- int **dpx.max** = 0: maximum payload before alert { 0:65535 }

Rules:

- **256:1** (dpx) too much data sent to port

Peg counts:

- **dpx.packets**: total packets

5.8 ftp_client

What: FTP client configuration module for use with ftp_server

Type: inspector

Configuration:

- bool **ftp_client.bounce** = false: check for bounces
- addr **ftp_client.bounce_to[].address** = 1.0.0.0/32: allowed ip address in CIDR format
- port **ftp_client.bounce_to[].port** = 20: allowed port { 1: }
- port **ftp_client.bounce_to[].last_port**: optional allowed range from port to last_port inclusive { 0: }
- bool **ftp_client.ignore_telnet_erase_cmds** = false: ignore erase character and erase line commands when normalizing
- int **ftp_client.max_resp_len** = -1: maximum ftp response accepted by client { -1: }
- bool **ftp_client.telnet_cmds** = false: detect telnet escape sequences on ftp control channel

5.9 ftp_data

What: FTP data channel handler

Type: inspector

Peg counts:

- **ftp_data.packets**: total packets

5.10 ftp_server

What: main FTP module; ftp_client should also be configured

Type: inspector

Configuration:

- string **ftp_server.chk_str_fmt**: check the formatting of the given commands
- string **ftp_server.data_chan_cmds**: check the formatting of the given commands
- string **ftp_server.data_xfer_cmds**: check the formatting of the given commands
- string **ftp_server.directory_cmds[].dir_cmd**: directory command
- int **ftp_server.directory_cmds[].rsp_code** = 200: expected successful response code for command { 200: }
- string **ftp_server.file_put_cmds**: check the formatting of the given commands
- string **ftp_server.file_get_cmds**: check the formatting of the given commands
- string **ftp_server.encr_cmds**: check the formatting of the given commands
- string **ftp_server.login_cmds**: check the formatting of the given commands
- bool **ftp_server.check_encrypted** = false: check for end of encryption
- string **ftp_server.cmd_validity[].command**: command string
- string **ftp_server.cmd_validity[].format**: format specification
- int **ftp_server.cmd_validity[].length** = 0: specify non-default maximum for command { 0: }
- int **ftp_server.def_max_param_len** = 100: default maximum length of commands handled by server; 0 is unlimited { 1: }
- bool **ftp_server.encrypted_traffic** = false: check for encrypted telnet and ftp
- string **ftp_server.ftp_cmds**: specify additional commands supported by server beyond RFC 959
- bool **ftp_server.ignore_data_chan** = false: do not inspect ftp data channels
- bool **ftp_server.ignore_telnet_erase_cmds** = false: ignore erase character and erase line commands when normalizing
- bool **ftp_server.print_cmds** = false: print command configurations on start up
- bool **ftp_server.telnet_cmds** = false: detect telnet escape sequences of ftp control channel

Rules:

- **125:1** (ftp_server) TELNET cmd on FTP command channel
- **125:2** (ftp_server) invalid FTP command
- **125:3** (ftp_server) FTP command parameters were too long
- **125:4** (ftp_server) FTP command parameters were malformed
- **125:5** (ftp_server) FTP command parameters contained potential string format
- **125:6** (ftp_server) FTP response message was too long
- **125:7** (ftp_server) FTP traffic encrypted
- **125:8** (ftp_server) FTP bounce attempt
- **125:9** (ftp_server) evasive (incomplete) TELNET cmd on FTP command channel

Peg counts:

- **ftp_server.packets**: total packets

5.11 gtp_inspect

What: gtp control channel inspection

Type: inspector

Configuration:

- int **gtp_inspect[].version** = 2: gtp version { 0:2 }
- int **gtp_inspect[].messages[].type** = 0: message type code { 0:255 }
- string **gtp_inspect[].messages[].name**: message name
- int **gtp_inspect[].infos[].type** = 0: information element type code { 0:255 }
- string **gtp_inspect[].infos[].name**: information element name
- int **gtp_inspect[].infos[].length** = 0: information element type code { 0:255 }

Rules:

- **143:1** (gtp_inspect) message length is invalid
- **143:2** (gtp_inspect) information element length is invalid
- **143:3** (gtp_inspect) information elements are out of order

Peg counts:

- **gtp_inspect.sessions**: total sessions processed
- **gtp_inspect.events**: requests
- **gtp_inspect.unknown types**: unknown message types
- **gtp_inspect.unknown infos**: unknown information elements

5.12 http_global

What: http inspector global configuration and client rules for use with http_server

Type: inspector

Configuration:

- int **http_global.compress_depth** = 65535: maximum amount of packet payload to decompress { 1:65535 }
- int **http_global.decode.b64_decode_depth** = 0: single packet decode depth { -1:65535 }
- int **http_global.decode.bitenc_decode_depth** = 0: single packet decode depth { -1:65535 }
- int **http_global.decode.max_mime_mem** = 838860: single packet decode depth { 3276: }
- int **http_global.decode.qp_decode_depth** = 0: single packet decode depth { -1:65535 }
- int **http_global.decode.uu_decode_depth** = 0: single packet decode depth { -1:65535 }
- int **http_global.decompress_depth** = 65535: maximum amount of decompressed data to process { 1:65535 }
- bool **http_global.detect_anomalous_servers** = false: inspect non-configured ports for HTTP - bad idea
- int **http_global.max_gzip_mem** = 838860: total memory used for decompression across all active sessions { 3276: }

- int **http_global.memcap** = 150994944: limit of memory used for logging extra data { 2304: }
- bool **http_global.proxy_alert** = false: alert on proxy usage for servers without allow_proxy_use
- int **http_global.unicode_map.code_page** = 1252: select code page in map file { 0: }
- string **http_global.unicode_map.map_file**: unicode map file

Rules:

- **119:1** (http_global) ascii encoding
- **119:2** (http_global) double decoding attack
- **119:3** (http_global) u encoding
- **119:4** (http_global) bare byte unicode encoding
- **119:5** (http_global) base36 encoding
- **119:6** (http_global) UTF-8 encoding
- **119:7** (http_global) IIS unicode codepoint encoding
- **119:8** (http_global) multi_slash encoding
- **119:9** (http_global) IIS backslash evasion
- **119:10** (http_global) self directory traversal
- **119:11** (http_global) directory traversal
- **119:12** (http_global) apache whitespace (tab)
- **119:13** (http_global) non-RFC http delimiter
- **119:14** (http_global) non-RFC defined char
- **119:15** (http_global) oversize request-URI directory
- **119:16** (http_global) oversize chunk encoding
- **119:17** (http_global) unauthorized proxy use detected
- **119:18** (http_global) webroot directory traversal
- **119:19** (http_global) long header
- **119:20** (http_global) max header fields
- **119:21** (http_global) multiple content length
- **119:22** (http_global) chunk size mismatch detected
- **119:23** (http_global) invalid ip in true-client-IP/XFF header
- **119:24** (http_global) multiple host hdrs detected
- **119:25** (http_global) hostname exceeds 255 characters
- **119:26** (http_global) header parsing space saturation
- **119:27** (http_global) client consecutive small chunk sizes
- **119:28** (http_global) post w/o content-length or chunks
- **119:29** (http_global) multiple true IPs in a session

- **119:30** (http_global) both true-client-IP and XFF hdrs present
- **119:31** (http_global) unknown method
- **119:32** (http_global) simple request
- **119:33** (http_global) unescaped space in http URI
- **119:34** (http_global) too many pipelined requests

Peg counts:

- **http_global.packets**: total packets processed
- **http_global.gets**: GET requests
- **http_global.posts**: POST requests
- **http_global.request headers**: total requests
- **http_global.response headers**: total responses
- **http_global.request cookies**: requests with Cookie
- **http_global.response cookies**: responses with Set-Cookie
- **http_global.post params**: POST parameters extracted
- **http_global.unicode**: unicode normalizations
- **http_global.double unicode**: double unicode normalizations
- **http_global.non-ascii**: non-ascii normalizations
- **http_global.paths with ../**: directory traversal normalizations
- **http_global.paths with //**: double slash normalizations
- **http_global.paths with ./**: relative directory normalizations
- **http_global.gzip packets**: packets with gzip compression
- **http_global.compressed bytes**: total comparessed bytes processed
- **http_global.decompressed bytes**: total bytes decompressed

5.13 http_inspect

What: http inspection and server rules; also configure http_inspect

Type: inspector

Configuration:

- bool **http_inspect.allow_proxy_use** = false: don't alert on proxy use for this server
- bool **http_inspect.decompress_pdf** = false: enable decompression of the compressed portions of PDF files
- bool **http_inspect.decompress_swf** = false: enable decompression of SWF (Adobe Flash content)
- bool **http_inspect.enable_cookies** = true: extract cookies
- bool **http_inspect.enable_xff** = false: log True-Client-IP and X-Forwarded-For headers with unified2 alerts as extra data
- bool **http_inspect.extended_ascii_uri** = false: allow extended ASCII codes in the request URI

- bool **http_inspect.extended_response_inspection** = true: extract response headers
- string **http_inspect.http_methods** = GET POST PUT SEARCH MKCOL COPY MOVE LOCK UNLOCK NOTIFY POLL BCOPY BDELETE BMOVE LINK UNLINK OPTIONS HEAD DELETE TRACE TRACK CONNECT SOURCE SUBSCRIBE UNSUBSCRIBE PROPFIND PROPPATCH BPROPFIND BPROPPATCH RPC_CONNECT PROXY_SUCCESS BITS_POST CCM_POST SMS_POST RPC_IN_DATA RPC_OUT_DATA RPC_ECHO_DATA: request methods allowed in addition to GET and POST
- bool **http_inspect.inspect_gzip** = true: enable gzip decompression of compressed bodies
- bool **http_inspect.inspect_uri_only** = false: disable all detection except for uricontent
- bool **http_inspect.log_hostname** = false: enable logging of Hostname with unified2 alerts as extra data
- bool **http_inspect.log_uri** = false: enable logging of URI with unified2 alerts as extra data
- bool **http_inspect.no_pipeline_req** = false: don't inspect pipelined requests after first (still does general detection)
- bit_list **http_inspect.non_rfc_chars** = 0x00 0x01 0x02 0x03 0x04 0x05 0x06 0x07: alert on given non-RFC chars being present in the URI { 255 }
- bool **http_inspect.normalize_cookies** = false: normalize cookies similar to URI
- bool **http_inspect.normalize_headers** = false: normalize headers other than cookie similar to URI
- int **http_inspect.oversize_dir_length** = 500: alert if a URL has a directory longer than this limit { 0: }
- bool **http_inspect.profile.apache_whitespace** = false: don't alert if tab is used in lieu of space characters
- bool **http_inspect.profile.ascii** = false: enable decoding ASCII like %2f to /
- bool **http_inspect.profile.bare_byte** = false: decode non-standard, non-ASCII character encodings
- int **http_inspect.profile.chunk_length** = 500000: alert on chunk lengths greater than specified { 1: }
- int **http_inspect.profile.client_flow_depth** = 0: raw request payload to inspect { -1:1460 }
- bool **http_inspect.profile.directory** = false: normalize . and .. sequences out of URI
- bool **http_inspect.profile.double_decode** = false: iis specific extra decoding
- bool **http_inspect.profile.iis_backslash** = false: normalize directory slashes
- bool **http_inspect.profile.iis_delimiter** = false: allow use of non-standard delimiter
- bool **http_inspect.profile.iis_unicode** = false: enable unicode code point mapping using unicode_map settings
- int **http_inspect.profile.iis_unicode_map.code_page** = 1252: select code page in map file { 0: }
- string **http_inspect.profile.iis_unicode_map.map_file**: unicode map file
- int **http_inspect.profile.max_header_length** = 750: maximum allowed client request header field { 0:65535 }
- int **http_inspect.profile.max_headers** = 100: maximum allowed client request headers { 0:1024 }
- int **http_inspect.profile.max_spaces** = 200: maximum allowed whitespaces when folding { 0:65535 }
- bool **http_inspect.profile.multi_slash** = false: normalize out consecutive slashes in URI
- bool **http_inspect.profile.non_strict** = true: allows HTTP 0.9 processing
- int **http_inspect.profile.max_javascript_whitespaces** = 200: maximum number of consecutive whitespaces { 0: }
- bool **http_inspect.profile.normalize_utf** = true: normalize response bodies with UTF content-types
- bool **http_inspect.profile.normalize_javascript** = true: normalize javascript between <script> tags
- int **http_inspect.profile.post_depth** = 65495: amount of POST data to inspect { -1:65535 }

- enum **http_inspect.profile.profile_type** = default: set defaults appropriate for selected server { default | apache | iis | iis_40 | iis_50 }
- int **http_inspect.profile.server_flow_depth** = 0: response payload to inspect; includes headers with extended_response_inspection { -1:65535 }
- bool **http_inspect.profile.u_encode** = true: decode %uXXXX character sequences
- bool **http_inspect.profile.utf_8** = false: decode UTF-8 unicode sequences in URI
- bool **http_inspect.profile.webroot** = false: alert on directory traversals past the top level (web server root)
- bit_list **http_inspect.profile.whitespace_chars**: allowed white space characters { 255 }
- int **http_inspect.small_chunk_count** = 5: alert if more than this limit of consecutive chunks are below small_chunk_length { 0:255 }
- int **http_inspect.small_chunk_length** = 10: alert if more than small_chunk_count consecutive chunks below this limit { 0:255 }
- bool **http_inspect.tab_uri_delimiter** = false: whether a tab not preceded by a space is considered a delimiter or part of URI
- bool **http_inspect.unlimited_decompress** = true: decompress across multiple packets
- bool **http_inspect.xff_headers** = false: not implemented

Rules:

- **120:1** (http_inspect) anomalous http server on undefined HTTP port
- **120:2** (http_inspect) invalid status code in HTTP response
- **120:3** (http_inspect) no content-length or transfer-encoding in HTTP response
- **120:4** (http_inspect) HTTP response has UTF charset which failed to normalize
- **120:5** (http_inspect) HTTP response has UTF-7 charset
- **120:6** (http_inspect) HTTP response gzip decompression failed
- **120:7** (http_inspect) server consecutive small chunk sizes
- **120:8** (http_inspect) invalid content-length or chunk size
- **120:9** (http_inspect) javascript obfuscation levels exceeds 1
- **120:10** (http_inspect) javascript whitespaces exceeds max allowed
- **120:11** (http_inspect) multiple encodings within javascript obfuscated data
- **120:12** (http_inspect) HTTP response SWF file zlib decompression failure
- **120:13** (http_inspect) HTTP response SWF file LZMA decompression failure
- **120:14** (http_inspect) HTTP response PDF file deflate decompression failure
- **120:15** (http_inspect) HTTP response PDF file unsupported compression type
- **120:16** (http_inspect) HTTP response PDF file cascaded compression
- **120:17** (http_inspect) HTTP response PDF file parse failure

5.14 imap

What: imap inspection

Type: inspector

Configuration:

- int **imap.b64_decode_depth** = 1460: base64 decoding depth { -1:65535 }
- int **imap.bitenc_decode_depth** = 1460: Non-Encoded MIME attachment extraction depth { -1:65535 }
- int **imap.qp_decode_depth** = 1460: Quoted Printable decoding depth { -1:65535 }
- int **imap.uu_decode_depth** = 1460: Unix-to-Unix decoding depth { -1:65535 }

Rules:

- **141:1** (imap) Unknown IMAP3 command
- **141:2** (imap) Unknown IMAP3 response
- **141:4** (imap) Base64 Decoding failed.
- **141:5** (imap) Quoted-Printable Decoding failed.
- **141:7** (imap) Unix-to-Unix Decoding failed.

Peg counts:

- **imap.packets**: total packets processed
- **imap.sessions**: total imap sessions
- **imap.b64 attachments**: total base64 attachments decoded
- **imap.b64 decoded bytes**: total base64 decoded bytes
- **imap.qp attachments**: total quoted-printable attachments decoded
- **imap.qp decoded bytes**: total quoted-printable decoded bytes
- **imap.uu attachments**: total uu attachments decoded
- **imap.uu decoded bytes**: total uu decoded bytes
- **imap.non-encoded attachments**: total non-encoded attachments extracted
- **imap.non-encoded bytes**: total non-encoded extracted bytes

5.15 modbus

What: modbus inspection

Type: inspector

Rules:

- **144:1** (modbus) length in Modbus MBAP header does not match the length needed for the given function
- **144:2** (modbus) Modbus protocol ID is non-zero
- **144:3** (modbus) Reserved Modbus function code in use

Peg counts:

- **modbus.sessions**: total sessions processed
- **modbus.frames**: total Modbus messages

5.16 new_http_inspect

What: new HTTP inspector

Type: inspector

Configuration:

- int **new_http_inspect.request_depth** = -1: maximum request message body bytes to examine (-1 no limit) { -1: }
- int **new_http_inspect.response_depth** = -1: maximum response message body bytes to examine (-1 no limit) { -1: }
- bool **new_http_inspect.unzip** = true: decompress gzip and deflate message bodies

Rules:

- **219:1** (new_http_inspect) ascii encoding
- **219:2** (new_http_inspect) double decoding attack
- **219:3** (new_http_inspect) u encoding
- **219:4** (new_http_inspect) bare byte unicode encoding
- **219:5** (new_http_inspect) obsolete event—should not appear
- **219:6** (new_http_inspect) UTF-8 encoding
- **219:7** (new_http_inspect) IIS unicode codepoint encoding
- **219:8** (new_http_inspect) multi_slash encoding
- **219:9** (new_http_inspect) IIS backslash evasion
- **219:10** (new_http_inspect) self directory traversal
- **219:11** (new_http_inspect) directory traversal
- **219:12** (new_http_inspect) apache whitespace (tab)
- **219:13** (new_http_inspect) non-RFC http delimiter
- **219:14** (new_http_inspect) non-RFC defined char
- **219:15** (new_http_inspect) oversize request-uri directory
- **219:16** (new_http_inspect) oversize chunk encoding
- **219:17** (new_http_inspect) unauthorized proxy use detected
- **219:18** (new_http_inspect) webroot directory traversal
- **219:19** (new_http_inspect) long header
- **219:20** (new_http_inspect) max header fields
- **219:21** (new_http_inspect) multiple content length
- **219:22** (new_http_inspect) chunk size mismatch detected
- **219:23** (new_http_inspect) invalid IP in true-client-IP/XFF header
- **219:24** (new_http_inspect) multiple host hdrs detected
- **219:25** (new_http_inspect) hostname exceeds 255 characters
- **219:26** (new_http_inspect) header parsing space saturation

- **219:27** (new_http_inspect) client consecutive small chunk sizes
- **219:28** (new_http_inspect) post w/o content-length or chunks
- **219:29** (new_http_inspect) multiple true ips in a session
- **219:30** (new_http_inspect) both true-client-IP and XFF hdrs present
- **219:31** (new_http_inspect) unknown method
- **219:32** (new_http_inspect) simple request
- **219:33** (new_http_inspect) unescaped space in HTTP URI
- **219:34** (new_http_inspect) too many pipelined requests
- **219:35** (new_http_inspect) anomalous http server on undefined HTTP port
- **219:36** (new_http_inspect) invalid status code in HTTP response
- **219:37** (new_http_inspect) no content-length or transfer-encoding in HTTP response
- **219:38** (new_http_inspect) HTTP response has UTF charset which failed to normalize
- **219:39** (new_http_inspect) HTTP response has UTF-7 charset
- **219:40** (new_http_inspect) HTTP response gzip decompression failed
- **219:41** (new_http_inspect) server consecutive small chunk sizes
- **219:42** (new_http_inspect) invalid content-length or chunk size
- **219:43** (new_http_inspect) javascript obfuscation levels exceeds 1
- **219:44** (new_http_inspect) javascript whitespaces exceeds max allowed
- **219:45** (new_http_inspect) multiple encodings within javascript obfuscated data
- **219:46** (new_http_inspect) SWF file zlib decompression failure
- **219:47** (new_http_inspect) SWF file LZMA decompression failure
- **219:48** (new_http_inspect) PDF file deflate decompression failure
- **219:49** (new_http_inspect) PDF file unsupported compression type
- **219:50** (new_http_inspect) PDF file cascaded compression
- **219:51** (new_http_inspect) PDF file parse failure
- **219:52** (new_http_inspect) HTTP misformatted or not really HTTP
- **219:53** (new_http_inspect) Chunk length has excessive leading zeros
- **219:54** (new_http_inspect) White space before or between messages
- **219:55** (new_http_inspect) Request message without URI
- **219:56** (new_http_inspect) Control character in reason phrase
- **219:57** (new_http_inspect) Illegal extra whitespace in start line
- **219:58** (new_http_inspect) Corrupted HTTP version
- **219:59** (new_http_inspect) Unknown HTTP version
- **219:60** (new_http_inspect) Format error in HTTP header
- **219:61** (new_http_inspect) Chunk header options present

- **219:62** (new_http_inspect) URI badly formatted
- **219:63** (new_http_inspect) URI bad port number
- **219:64** (new_http_inspect) HTTP chunk misformatted
- **219:65** (new_http_inspect) White space following chunk length
- **219:67** (new_http_inspect) Excessive gzip compression
- **219:68** (new_http_inspect) Gzip decompression failed

5.17 normalizer

What: packet scrubbing for inline mode

Type: inspector

Configuration:

- bool **normalizer.ip4.base** = true: clear options
- bool **normalizer.ip4.df** = false: clear don't frag flag
- bool **normalizer.ip4.rf** = false: clear reserved flag
- bool **normalizer.ip4.tos** = false: clear tos / differentiated services byte
- bool **normalizer.ip4.trim** = false: truncate excess payload beyond datagram length
- bool **normalizer.tcp.base** = true: clear reserved bits and option padding and fix urgent pointer / flags issues
- bool **normalizer.tcp.block** = true: allow packet drops during TCP normalization
- bool **normalizer.tcp.urp** = true: adjust urgent pointer if beyond segment length
- bool **normalizer.tcp.ips** = false: ensure consistency in retransmitted data
- select **normalizer.tcp.ecn** = off: clear ecn for all packets | sessions w/o ecn setup { off | packet | stream }
- bool **normalizer.tcp.pad** = true: clear any option padding bytes
- bool **normalizer.tcp.trim_syn** = false: remove data on SYN
- bool **normalizer.tcp.trim_rst** = false: remove any data from RST packet
- bool **normalizer.tcp.trim_win** = false: trim data to window
- bool **normalizer.tcp.trim_mss** = false: trim data to MSS
- bool **normalizer.tcp.trim** = false: enable all of the TCP trim options
- bool **normalizer.tcp.opts** = true: clear all options except mss, wscale, timestamp, and any explicitly allowed
- bool **normalizer.tcp.req_urg** = true: clear the urgent pointer if the urgent flag is not set
- bool **normalizer.tcp.req_pay** = true: clear the urgent pointer and the urgent flag if there is no payload
- bool **normalizer.tcp.rsv** = true: clear the reserved bits in the TCP header
- bool **normalizer.tcp.req_urp** = true: clear the urgent flag if the urgent pointer is not set
- multi **normalizer.tcp.allow_names**: don't clear given option names { sack | echo | partial_order | conn_count | alt_checksum | md5 }
- string **normalizer.tcp.allow_codes**: don't clear given option codes

- bool **normalizer.ip6** = false: clear reserved flag
- bool **normalizer.icmp4** = false: clear reserved flag
- bool **normalizer.icmp6** = false: clear reserved flag

Peg counts:

- **normalizer.ip4 trim**: eth packets trimmed to datagram size
- **normalizer.test ip4 trim**: test eth packets trimmed to datagram size
- **normalizer.ip4 tos**: type of service normalizations
- **normalizer.test ip4 tos**: test type of service normalizations
- **normalizer.ip4 df**: don't frag bit normalizations
- **normalizer.test ip4 df**: test don't frag bit normalizations
- **normalizer.ip4 rf**: reserved flag bit clears
- **normalizer.test ip4 rf**: test reserved flag bit clears
- **normalizer.ip4 ttl**: time-to-live normalizations
- **normalizer.test ip4 ttl**: test time-to-live normalizations
- **normalizer.ip4 opts**: ip4 options cleared
- **normalizer.test ip4 opts**: test ip4 options cleared
- **normalizer.icmp4 echo**: icmp4 ping normalizations
- **normalizer.test icmp4 echo**: test icmp4 ping normalizations
- **normalizer.ip6 hops**: ip6 hop limit normalizations
- **normalizer.test ip6 hops**: test ip6 hop limit normalizations
- **normalizer.ip6 options**: ip6 options cleared
- **normalizer.test ip6 options**: test ip6 options cleared
- **normalizer.icmp6 echo**: icmp6 echo normalizations
- **normalizer.test icmp6 echo**: test icmp6 echo normalizations
- **normalizer.tcp syn options**: SYN only options cleared from non-SYN packets
- **normalizer.test tcp syn options**: test SYN only options cleared from non-SYN packets
- **normalizer.tcp options**: packets with options cleared
- **normalizer.test tcp options**: test packets with options cleared
- **normalizer.tcp paddding**: packets with padding cleared
- **normalizer.test tcp paddding**: test packets with padding cleared
- **normalizer.tcp reserved**: packets with reserved bits cleared
- **normalizer.test tcp reserved**: test packets with reserved bits cleared
- **normalizer.tcp nonce**: packets with nonce bit cleared
- **normalizer.test tcp nonce**: test packets with nonce bit cleared

- **normalizer.tcp urgent ptr**: packets without data with urgent pointer cleared
- **normalizer.test tcp urgent ptr**: test packets without data with urgent pointer cleared
- **normalizer.tcp ecn pkt**: packets with ECN bits cleared
- **normalizer.test tcp ecn pkt**: test packets with ECN bits cleared
- **normalizer.tcp ts ecr**: timestamp cleared on non-ACKs
- **normalizer.test tcp ts ecr**: test timestamp cleared on non-ACKs
- **normalizer.tcp req urg**: cleared urgent pointer when urgent flag is not set
- **normalizer.test tcp req urg**: test cleared urgent pointer when urgent flag is not set
- **normalizer.tcp req pay**: cleared urgent pointer and urgent flag when there is no payload
- **normalizer.test tcp req pay**: test cleared urgent pointer and urgent flag when there is no payload
- **normalizer.tcp req urp**: cleared the urgent flag if the urgent pointer is not set
- **normalizer.test tcp req urp**: test cleared the urgent flag if the urgent pointer is not set
- **normalizer.tcp trim syn**: tcp segments trimmed on SYN
- **normalizer.test tcp trim syn**: test tcp segments trimmed on SYN
- **normalizer.tcp trim rst**: RST packets with data trimmed
- **normalizer.test tcp trim rst**: test RST packets with data trimmed
- **normalizer.tcp trim win**: data trimed to window
- **normalizer.test tcp trim win**: test data trimed to window
- **normalizer.tcp trim mss**: data trimmed to MSS
- **normalizer.test tcp trim mss**: test data trimmed to MSS
- **normalizer.tcp ecn session**: ECN bits cleared
- **normalizer.test tcp ecn session**: test ECN bits cleared
- **normalizer.tcp ts nop**: timestamp options cleared
- **normalizer.test tcp ts nop**: test timestamp options cleared
- **normalizer.tcp ips data**: normalized segments
- **normalizer.test tcp ips data**: test normalized segments
- **normalizer.tcp block**: blocked segments
- **normalizer.test tcp block**: test blocked segments

5.18 perf_monitor

What: performance monitoring and flow statistics collection

Type: inspector

Configuration:

- int **perf_monitor.packets** = 10000: minim packets to report { 0: }
- int **perf_monitor.seconds** = 60: report interval; 0 means report at exit only { 0: }
- int **perf_monitor.flow_ip_memcap** = 52428800: maximum memory for flow tracking { 8200: }
- int **perf_monitor.max_file_size** = 1073741824: files will be rolled over if they exceed this size { 4096: }
- int **perf_monitor.flow_ports** = 1023: maximum ports to track { 0: }
- bool **perf_monitor.reset** = true: reset (clear) statistics after each reporting interval
- bool **perf_monitor.max** = false: calculate theoretical maximum performance
- bool **perf_monitor.console** = false: output to console
- bool **perf_monitor.events** = false: report on qualified vs non-qualified events
- bool **perf_monitor.file** = false: output base stats to perf_monitor.csv instead of stdout
- bool **perf_monitor.flow** = false: enable traffic statistics
- bool **perf_monitor.flow_file** = false: output traffic statistics to a perf_monitor_flow.csv instead of stdout
- bool **perf_monitor.flow_ip** = false: enable statistics on host pairs
- bool **perf_monitor.flow_ip_file** = false: output host pair statistics to perf_monitor_flow_ip.csv instead of stdout

Peg counts:

- **perf_monitor.packets**: total packets

5.19 pop

What: pop inspection

Type: inspector

Configuration:

- int **pop.b64_decode_depth** = 1460: base64 decoding depth { -1:65535 }
- int **pop.bitenc_decode_depth** = 1460: Non-Encoded MIME attachment extraction depth { -1:65535 }
- int **pop.qp_decode_depth** = 1460: Quoted Printable decoding depth { -1:65535 }
- int **pop.uu_decode_depth** = 1460: Unix-to-Unix decoding depth { -1:65535 }

Rules:

- **142:1** (pop) Unknown POP3 command
- **142:2** (pop) Unknown POP3 response
- **142:4** (pop) Base64 Decoding failed.

- **142:5** (pop) Quoted-Printable Decoding failed.
- **142:7** (pop) Unix-to-Unix Decoding failed.

Peg counts:

- **pop.packets**: total packets processed
- **pop.sessions**: total pop sessions
- **pop.b64 attachments**: total base64 attachments decoded
- **pop.b64 decoded bytes**: total base64 decoded bytes
- **pop.qp attachments**: total quoted-printable attachments decoded
- **pop.qp decoded bytes**: total quoted-printable decoded bytes
- **pop.uu attachments**: total uu attachments decoded
- **pop.uu decoded bytes**: total uu decoded bytes
- **pop.non-encoded attachments**: total non-encoded attachments extracted
- **pop.non-encoded bytes**: total non-encoded extracted bytes

5.20 port_scan

What: port scan inspector; also configure port_scan_global

Type: inspector

Configuration:

- multi **port_scan.protos** = all: choose the protocols to monitor { tcp | udp | icmp | ip | all }
- multi **port_scan.scan_types** = all: choose type of scans to look for { portscan | portsweep | decoy_portscan | distributed_portscan | all }
- enum **port_scan.sense_level** = medium: choose the level of detection { low | medium | high }
- string **port_scan.watch_ip**: list of CIDRs with optional ports to watch
- string **port_scan.ignore_scanners**: list of CIDRs with optional ports to ignore if the source of scan alerts
- string **port_scan.ignore_scanned**: list of CIDRs with optional ports to ignore if the destination of scan alerts
- bool **port_scan.include_midstream** = false: list of CIDRs with optional ports
- bool **port_scan.logfile** = false: write scan events to file

Rules:

- **122:1** (port_scan) TCP portscan
- **122:2** (port_scan) TCP decoy portscan
- **122:3** (port_scan) TCP portsweep
- **122:4** (port_scan) TCP distributed portscan
- **122:5** (port_scan) TCP filtered portscan
- **122:6** (port_scan) TCP filtered decoy portscan

- **122:7** (port_scan) TCP filtered portsweep
- **122:8** (port_scan) TCP filtered distributed portscan
- **122:9** (port_scan) IP protocol scan
- **122:10** (port_scan) IP decoy protocol scan
- **122:11** (port_scan) IP protocol sweep
- **122:12** (port_scan) IP distributed protocol scan
- **122:13** (port_scan) IP filtered protocol scan
- **122:14** (port_scan) IP filtered decoy protocol scan
- **122:15** (port_scan) IP filtered protocol sweep
- **122:16** (port_scan) IP filtered distributed protocol scan
- **122:17** (port_scan) UDP portscan
- **122:18** (port_scan) UDP decoy portscan
- **122:19** (port_scan) UDP portsweep
- **122:20** (port_scan) UDP distributed portscan
- **122:21** (port_scan) UDP filtered portscan
- **122:22** (port_scan) UDP filtered decoy portscan
- **122:23** (port_scan) UDP filtered portsweep
- **122:24** (port_scan) UDP filtered distributed portscan
- **122:25** (port_scan) ICMP sweep
- **122:26** (port_scan) ICMP filtered sweep
- **122:27** (port_scan) open port

5.21 port_scan_global

What: shared settings for port_scan inspectors for use with port_scan

Type: inspector

Configuration:

- int **port_scan_global.memcap** = 1048576: maximum tracker memory { 1: }

Peg counts:

- **port_scan_global.packets**: total packets

5.22 reputation

What: reputation inspection

Type: inspector

Configuration:

- string **reputation.blacklist**: blacklist file name with ip lists
- int **reputation.memcap** = 500: maximum total memory allocated { 1:4095 }
- enum **reputation.nested_ip** = inner: ip to use when there is IP encapsulation { inner|outer|all }
- enum **reputation.priority** = whitelist: defines priority when there is a decision conflict during run-time { blacklist|whitelist }
- bool **reputation.scan_local** = false: inspect local address defined in RFC 1918
- enum **reputation.white** = unblack: specify the meaning of whitelist { unblack|trust }
- string **reputation.whitelist**: whitelist file name with ip lists

Rules:

- **136:1** (reputation) packets blacklisted
- **136:2** (reputation) Packets whitelisted
- **136:3** (reputation) Packets monitored

Peg counts:

- **reputation.packets**: total packets processed
- **reputation.blacklisted**: number of packets blacklisted
- **reputation.whitelisted**: number of packets whitelisted
- **reputation.monitored**: number of packets monitored
- **reputation.memory_allocated**: total memory allocated

5.23 rpc_decode

What: RPC inspector

Type: inspector

Rules:

- **106:1** (rpc_decode) fragmented RPC records
- **106:2** (rpc_decode) multiple RPC records
- **106:3** (rpc_decode) large RPC record fragment
- **106:4** (rpc_decode) incomplete RPC segment
- **106:5** (rpc_decode) zero-length RPC fragment

Peg counts:

- **rpc_decode.packets**: total packets

5.24 sip

What: sip inspection

Type: inspector

Configuration:

- bool **sip.ignore_call_channel** = false: enables the support for ignoring audio/video data channel
- int **sip.max_call_id_len** = 256: maximum call id field size { 0:65535 }
- int **sip.max_contact_len** = 256: maximum contact field size { 0:65535 }
- int **sip.max_content_len** = 1024: maximum content length of the message body { 0:65535 }
- int **sip.max_dialogs** = 4: maximum number of dialogs within one stream session { 1:4194303 }
- int **sip.max_from_len** = 256: maximum from field size { 0:65535 }
- int **sip.max_requestName_len** = 20: maximum request name field size { 0:65535 }
- int **sip.max_sessions** = 10000: maximum number of sessions that can be allocated { 1024:4194303 }
- int **sip.max_to_len** = 256: maximum to field size { 0:65535 }
- int **sip.max_uri_len** = 256: maximum request uri field size { 0:65535 }
- int **sip.max_via_len** = 1024: maximum via field size { 0:65535 }
- string **sip.methods** = invite cancel ack bye register options: list of methods to check in sip messages

Rules:

- **140:1** (sip) Maximum sessions reached
- **140:2** (sip) Empty request URI
- **140:3** (sip) URI is too long
- **140:4** (sip) Empty call-Id
- **140:5** (sip) Call-Id is too long
- **140:6** (sip) CSeq number is too large or negative
- **140:7** (sip) Request name in CSeq is too long
- **140:8** (sip) Empty From header
- **140:9** (sip) From header is too long
- **140:10** (sip) Empty To header
- **140:11** (sip) To header is too long
- **140:12** (sip) Empty Via header
- **140:13** (sip) Via header is too long
- **140:14** (sip) Empty Contact
- **140:15** (sip) Contact is too long
- **140:16** (sip) Content length is too large or negative
- **140:17** (sip) Multiple SIP messages in a packet

- **140:18** (sip) Content length mismatch
- **140:19** (sip) Request name is invalid
- **140:20** (sip) Invite replay attack
- **140:21** (sip) Illegal session information modification
- **140:22** (sip) Response status code is not a 3 digit number
- **140:23** (sip) Empty Content-type header
- **140:24** (sip) SIP version is invalid
- **140:25** (sip) Mismatch in METHOD of request and the CSEQ header
- **140:26** (sip) Method is unknown
- **140:27** (sip) Maximum dialogs within a session reached

Peg counts:

- **sip.packets**: total packets
- **sip.sessions**: total sessions
- **sip.events**: events generated
- **sip.dialogs**: total dialogs
- **sip.ignored channels**: total channels ignored
- **sip.ignored sessions**: total sessions ignored
- **sip.total requests**: total requests
- **sip.invite**: invite
- **sip.cancel**: cancel
- **sip.ack**: ack
- **sip.bye**: bye
- **sip.register**: register
- **sip.options**: options
- **sip.refer**: refer
- **sip.subscribe**: subscribe
- **sip.update**: update
- **sip.join**: join
- **sip.info**: info
- **sip.message**: message
- **sip.notify**: notify
- **sip.prack**: prack
- **sip.total responses**: total responses
- **sip.1xx**: 1xx

- **sip.2xx**: 2xx
- **sip.3xx**: 3xx
- **sip.4xx**: 4xx
- **sip.5xx**: 5xx
- **sip.6xx**: 6xx
- **sip.7xx**: 7xx
- **sip.8xx**: 8xx
- **sip.9xx**: 9xx

5.25 smtp

What: smtp inspection

Type: inspector

Configuration:

- string **smtp.alt_max_command_line_len[].command**: command string
- int **smtp.alt_max_command_line_len[].length** = 0: specify non-default maximum for command { 0: }
- string **smtp.auth_cmds**: commands that initiate an authentication exchange
- string **smtp.binary_data_cmds**: commands that initiate sending of data and use a length value after the command
- int **smtp.bitenc_decode_depth** = 25: depth used to extract the non-encoded MIME attachments { -1:65535 }
- int **smtp.b64_decode_depth** = 25: depth used to decode the base64 encoded MIME attachments { -1:65535 }
- string **smtp.data_cmds**: commands that initiate sending of data with an end of data delimiter
- int **smtp.email_hdrs_log_depth** = 1464: depth for logging email headers { 0:20480 }
- bool **smtp.ignore_data** = false: ignore data section of mail
- bool **smtp.ignore_tls_data** = false: ignore TLS-encrypted data when processing rules
- string **smtp.invalid_cmds**: alert if this command is sent from client side
- bool **smtp.log_email_hdrs** = false: log the SMTP email headers extracted from SMTP data
- bool **smtp.log_filename** = false: log the MIME attachment filenames extracted from the Content-Disposition header within the MIME body
- bool **smtp.log_mailfrom** = false: log the sender's email address extracted from the MAIL FROM command
- bool **smtp.log_rcptto** = false: log the recipient's email address extracted from the RCPT TO command
- int **smtp.max_command_line_len** = 0: max Command Line Length { 0:65535 }
- int **smtp.max_header_line_len** = 0: max SMTP DATA header line { 0:65535 }
- int **smtp.max_response_line_len** = 0: max SMTP response line { 0:65535 }
- enum **smtp.normalize** = none: turns on/off normalization { none | cmds | all }
- string **smtp.normalize_cmds**: list of commands to normalize
- int **smtp.qp_decode_depth** = 25: quoted-Printable decoding depth { -1:65535 }

- int **smtp.uu_decode_depth** = 25: unix-to-Unix decoding depth { -1:65535 }
- string **smtp.valid_cmds**: list of valid commands
- enum **smtp.xlink2state** = alert: enable/disable xlink2state alert { disable | alert | drop }

Rules:

- **124:1** (smtp) Attempted command buffer overflow
- **124:2** (smtp) Attempted data header buffer overflow
- **124:3** (smtp) Attempted response buffer overflow
- **124:4** (smtp) Attempted specific command buffer overflow
- **124:5** (smtp) Unknown command
- **124:6** (smtp) Illegal command
- **124:7** (smtp) Attempted header name buffer overflow
- **124:8** (smtp) Attempted X-Link2State command buffer overflow
- **124:10** (smtp) Base64 Decoding failed.
- **124:11** (smtp) Quoted-Printable Decoding failed.
- **124:13** (smtp) Unix-to-Unix Decoding failed.
- **124:14** (smtp) Cyrus SASL authentication attack.

Peg counts:

- **smtp.packets**: total packets processed
- **smtp.sessions**: total smtp sessions
- **smtp.concurrent sessions**: total concurrent smtp sessions
- **smtp.max concurrent sessions**: maximum concurrent smtp sessions
- **smtp.b64 attachments**: total base64 attachments decoded
- **smtp.b64 decoded bytes**: total base64 decoded bytes
- **smtp.qp attachments**: total quoted-printable attachments decoded
- **smtp.qp decoded bytes**: total quoted-printable decoded bytes
- **smtp.uu attachments**: total uu attachments decoded
- **smtp.uu decoded bytes**: total uu decoded bytes
- **smtp.non-encoded attachments**: total non-encoded attachments extracted
- **smtp.non-encoded bytes**: total non-encoded extracted bytes

5.26 ssh

What: ssh inspection

Type: inspector

Configuration:

- int **ssh.max_encrypted_packets** = 25: ignore session after this many encrypted packets { 0:65535 }
- int **ssh.max_client_bytes** = 19600: number of unanswered bytes before alerting on challenge-response overflow or CRC32 { 0:65535 }
- int **ssh.max_server_version_len** = 80: limit before alerting on secure CRT server version string overflow { 0:255 }

Rules:

- **128:1** (ssh) Challenge-Response Overflow exploit
- **128:2** (ssh) SSH1 CRC32 exploit
- **128:3** (ssh) Server version string overflow
- **128:5** (ssh) Bad message direction
- **128:6** (ssh) Payload size incorrect for the given payload
- **128:7** (ssh) Failed to detect SSH version string

Peg counts:

- **ssh.packets**: total packets

5.27 ssl

What: ssl inspection

Type: inspector

Configuration:

- bool **ssl.trust_servers** = false: disables requirement that application (encrypted) data must be observed on both sides
- int **ssl.max_heartbeat_length** = 0: maximum length of heartbeat record allowed { 0:65535 }

Rules:

- **137:1** (ssl) Invalid Client HELLO after Server HELLO Detected
- **137:2** (ssl) Invalid Server HELLO without Client HELLO Detected
- **137:3** (ssl) Heartbeat Read Overrun Attempt Detected
- **137:4** (ssl) Large Heartbeat Response Detected

Peg counts:

- **ssl.packets**: total packets processed
- **ssl.decoded**: ssl packets decoded
- **ssl.client hello**: total client hellos

- **ssl.server hello**: total server hellos
- **ssl.certificate**: total ssl certificates
- **ssl.server done**: total server done
- **ssl.client key exchange**: total client key exchanges
- **ssl.server key exchange**: total server key exchanges
- **ssl.change cipher**: total change cipher records
- **ssl.finished**: total handshakes finished
- **ssl.client application**: total client application records
- **ssl.server application**: total server application records
- **ssl.alert**: total ssl alert records
- **ssl.unrecognized records**: total unrecognized records
- **ssl.handshakes completed**: total completed ssl handshakes
- **ssl.bad handshakes**: total bad handshakes
- **ssl.sessions ignored**: total sessions ignore
- **ssl.detection disabled**: total detection disabled

5.28 stream

What: common flow tracking

Type: inspector

Configuration:

- int **stream.ip_cache.max_sessions** = 16384: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.ip_cache.memcap** = 23920640: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.ip_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }
- int **stream.ip_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }
- int **stream.icmp_cache.max_sessions** = 32768: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.icmp_cache.memcap** = 1048576: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.icmp_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }
- int **stream.icmp_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }
- int **stream.tcp_cache.max_sessions** = 131072: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.tcp_cache.memcap** = 268435456: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.tcp_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }
- int **stream.tcp_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }
- int **stream.udp_cache.max_sessions** = 65536: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.udp_cache.memcap** = 0: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.udp_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }

- int **stream.udp_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }
- int **stream.user_cache.max_sessions** = 1024: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.user_cache.memcap** = 1048576: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.user_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }
- int **stream.user_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }
- int **stream.file_cache.max_sessions** = 128: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.file_cache.memcap** = 0: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.file_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }
- int **stream.file_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }

Peg counts:

- **stream.ip flows**: total ip sessions
- **stream.ip prunes**: ip sessions pruned
- **stream.icmp flows**: total icmp sessions
- **stream.icmp prunes**: icmp sessions pruned
- **stream.tcp flows**: total tcp sessions
- **stream.tcp prunes**: tcp sessions pruned
- **stream.udp flows**: total udp sessions
- **stream.udp prunes**: udp sessions pruned
- **stream.user flows**: total user sessions
- **stream.user prunes**: user sessions pruned
- **stream.file flows**: total file sessions
- **stream.file prunes**: file sessions pruned

5.29 stream_file

What: stream inspector for file flow tracking and processing

Type: inspector

Configuration:

- bool **stream_file.upload** = false: indicate file transfer direction

5.30 stream_icmp

What: stream inspector for ICMP flow tracking

Type: inspector

Configuration:

- int **stream_icmp.session_timeout** = 30: session tracking timeout { 1:86400 }

Peg counts:

- **stream_icmp.created**: icmp session trackers created
- **stream_icmp.released**: icmp session trackers released

5.31 stream_ip

What: stream inspector for IP flow tracking and defragmentation

Type: inspector

Configuration:

- int **stream_ip.max_frags** = 8192: maximum number of simultaneous fragments being tracked { 1: }
- int **stream_ip.max_overlaps** = 0: maximum allowed overlaps per datagram; 0 is unlimited { 0: }
- int **stream_ip.min_frag_length** = 0: alert if fragment length is below this limit before or after trimming { 0: }
- int **stream_ip.min_ttl** = 1: discard fragments with ttl below the minimum { 1:255 }
- enum **stream_ip.policy** = linux: fragment reassembly policy { first | linux | bsd | bsd_right | last | windows | solaris }
- int **stream_ip.session_timeout** = 30: session tracking timeout { 1:86400 }

Rules:

- **123:1** (stream_ip) inconsistent IP options on fragmented packets
- **123:2** (stream_ip) teardrop attack
- **123:3** (stream_ip) short fragment, possible DOS attempt
- **123:4** (stream_ip) fragment packet ends after defragmented packet
- **123:5** (stream_ip) zero-byte fragment packet
- **123:6** (stream_ip) bad fragment size, packet size is negative
- **123:7** (stream_ip) bad fragment size, packet size is greater than 65536
- **123:8** (stream_ip) fragmentation overlap
- **123:11** (stream_ip) TTL value less than configured minimum, not using for reassembly
- **123:12** (stream_ip) excessive fragment overlap
- **123:13** (stream_ip) tiny fragment

Peg counts:

- **stream_ip.fragments**: total fragments
- **stream_ip.reassembled**: reassembled datagrams
- **stream_ip.discards**: fragments discarded
- **stream_ip.memory faults**: memory faults
- **stream_ip.frag timeouts**: datagrams abandoned
- **stream_ip.overlaps**: overlapping fragments
- **stream_ip.anomalies**: anomalies detected
- **stream_ip.alerts**: alerts generated
- **stream_ip.drops**: fragments dropped
- **stream_ip.trackers added**: datagram trackers created
- **stream_ip.trackers freed**: datagram trackers released
- **stream_ip.nodes inserted**: fragments added to tracker
- **stream_ip.nodes deleted**: fragments deleted from tracker

5.32 stream_tcp

What: stream inspector for TCP flow tracking and stream normalization and reassembly

Type: inspector

Configuration:

- int **stream_tcp.flush_factor** = 0: flush upon seeing a drop in segment size after given number of non-decreasing segments { 0: }
- bool **stream_tcp.ignore_any_rules** = false: process tcp content rules w/o ports only if rules with ports are present
- int **stream_tcp.max_window** = 0: maximum allowed tcp window { 0:1073725440 }
- int **stream_tcp.overlap_limit** = 0: maximum number of allowed overlapping segments per session { 0:255 }
- int **stream_tcp.max_pdu** = 16384: maximum reassembled PDU size { 1460:65535 }
- enum **stream_tcp.policy** = bsd: determines operating system characteristics like reassembly { first | last | linux | old_linux | bsd | macos | solaris | irix | hpux11 | hpux10 | windows | win_2003 | vista | proxy }
- bool **stream_tcp.reassemble_async** = true: queue data for reassembly before traffic is seen in both directions
- int **stream_tcp.require_3whs** = -1: don't track midstream sessions after given seconds from start up; -1 tracks all { -1:86400 }
- bool **stream_tcp.show_rebuilt_packets** = false: enable cmg like output of reassembled packets
- int **stream_tcp.queue_limit.max_bytes** = 1048576: don't queue more than given bytes per session and direction { 0: }
- int **stream_tcp.queue_limit.max_segments** = 2621: don't queue more than given segments per session and direction { 0: }
- int **stream_tcp.small_segments.count** = 0: limit number of small segments queued { 0:2048 }
- int **stream_tcp.small_segments.maximum_size** = 0: limit number of small segments queued { 0:2048 }
- int **stream_tcp.session_timeout** = 30: session tracking timeout { 1:86400 }
- int **stream_tcp.footprint** = 0: use zero for production, non-zero for testing at given size { 0: }

Rules:

- **129:1** (stream_tcp) SYN on established session
- **129:2** (stream_tcp) data on SYN packet
- **129:3** (stream_tcp) data sent on stream not accepting data
- **129:4** (stream_tcp) TCP timestamp is outside of PAWS window
- **129:5** (stream_tcp) bad segment, adjusted size $\Leftarrow$ 0
- **129:6** (stream_tcp) window size (after scaling) larger than policy allows
- **129:7** (stream_tcp) limit on number of overlapping TCP packets reached
- **129:8** (stream_tcp) data sent on stream after TCP Reset sent
- **129:9** (stream_tcp) TCP client possibly hijacked, different ethernet address
- **129:10** (stream_tcp) TCP Server possibly hijacked, different ethernet address
- **129:11** (stream_tcp) TCP data with no TCP flags set
- **129:12** (stream_tcp) consecutive TCP small segments exceeding threshold

- **129:13** (stream_tcp) 4-way handshake detected
- **129:14** (stream_tcp) TCP timestamp is missing
- **129:15** (stream_tcp) reset outside window
- **129:16** (stream_tcp) FIN number is greater than prior FIN
- **129:17** (stream_tcp) ACK number is greater than prior FIN
- **129:18** (stream_tcp) data sent on stream after TCP Reset received
- **129:19** (stream_tcp) TCP window closed before receiving data
- **129:20** (stream_tcp) TCP session without 3-way handshake

Peg counts:

- **stream_tcp.sessions**: total sessions
- **stream_tcp.timeouts**: sessions timed out
- **stream_tcp.resyns**: SYN received on established session
- **stream_tcp.discards**: tcp packets discarded
- **stream_tcp.events**: events generated
- **stream_tcp.ignored**: tcp packets ignored
- **stream_tcp.untracked**: tcp packets not tracked
- **stream_tcp.syn trackers**: tcp session tracking started on syn
- **stream_tcp.syn-ack trackers**: tcp session tracking started on syn-ack
- **stream_tcp.3way trackers**: tcp session tracking started on ack
- **stream_tcp.data trackers**: tcp session tracking started on data
- **stream_tcp.trackers created**: tcp session trackers created
- **stream_tcp.trackers released**: tcp session trackers released
- **stream_tcp.segs queued**: total segments queued
- **stream_tcp.segs released**: total segments released
- **stream_tcp.segs split**: tcp segments split when reassembling PDUs
- **stream_tcp.segs used**: queued tcp segments applied to reassembled PDUs
- **stream_tcp.rebuilt packets**: total reassembled PDUs
- **stream_tcp.rebuilt buffers**: rebuilt PDU sections
- **stream_tcp.overlaps**: overlapping segments queued
- **stream_tcp.gaps**: missing data between PDUs
- **stream_tcp.max segs**: number of times the maximum queued segment limit was reached
- **stream_tcp.max bytes**: number of times the maximum queued byte limit was reached
- **stream_tcp.internal events**: 135:X events generated
- **stream_tcp.client cleanups**: number of times data from server was flushed when session released
- **stream_tcp.server cleanups**: number of times data from client was flushed when session released

5.33 stream_udp

What: stream inspector for UDP flow tracking

Type: inspector

Configuration:

- int **stream_udp.session_timeout** = 30: session tracking timeout { 1:86400 }
- bool **stream_udp.ignore_any_rules** = false: process udp content rules w/o ports only if rules with ports are present

Peg counts:

- **stream_udp.sessions**: total udp sessions
- **stream_udp.created**: udp session trackers created
- **stream_udp.released**: udp session trackers released
- **stream_udp.timeouts**: udp session timeouts

5.34 stream_user

What: stream inspector for user flow tracking and reassembly

Type: inspector

Configuration:

- int **stream_user.session_timeout** = 30: session tracking timeout { 1:86400 }

5.35 telnet

What: telnet inspection and normalization

Type: inspector

Configuration:

- int **telnet.ayt_attack_thresh** = -1: alert on this number of consecutive telnet AYT commands { -1: }
- bool **telnet.check_encrypted** = false: check for end of encryption
- bool **telnet.encrypted_traffic** = false: check for encrypted telnet and ftp
- bool **telnet.normalize** = false: eliminate escape sequences

Rules:

- **126:1** (telnet) consecutive telnet AYT commands beyond threshold
- **126:2** (telnet) telnet traffic encrypted
- **126:3** (telnet) telnet subnegotiation begin command without subnegotiation end

Peg counts:

- **telnet.packets**: total packets

5.36 wizard

What: inspector that implements port-independent protocol identification

Type: inspector

Configuration:

- string **wizard.hexes[].service**: name of service
- select **wizard.hexes[].proto** = tcp: protocol to scan { tcp | udp }
- bool **wizard.hexes[].client_first** = true: which end initiates data transfer
- string **wizard.hexes[].to_server[].hex**: sequence of data with wild chars (?)
- string **wizard.hexes[].to_client[].hex**: sequence of data with wild chars (?)
- string **wizard.spells[].service**: name of service
- select **wizard.spells[].proto** = tcp: protocol to scan { tcp | udp }
- bool **wizard.spells[].client_first** = true: which end initiates data transfer
- string **wizard.spells[].to_server[].spell**: sequence of data with wild cards (*)
- string **wizard.spells[].to_client[].spell**: sequence of data with wild cards (*)

Peg counts:

- **wizard.tcp scans**: tcp payload scans
- **wizard.tcp hits**: tcp identifications
- **wizard.udp scans**: udp payload scans
- **wizard.udp hits**: udp identifications
- **wizard.user scans**: user payload scans
- **wizard.user hits**: user identifications

6 IPS Action Modules

IPS actions allow you to perform custom actions when events are generated. Unlike loggers, these are invoked before thresholding and can be used to control external agents.

Externally defined actions must be configured to become available to the parser. For the reject rule, you can set reject = { } to get the rule to parse.

6.1 react

What: send response to client and terminate session

Type: ips_action

Configuration:

- bool **react.msg** = false: use rule msg in response page instead of default message
- string **react.page**: file containing HTTP response (headers and body)

6.2 reject

What: terminate session with TCP reset or ICMP unreachable

Type: ips_action

Configuration:

- enum **reject.reset**: send tcp reset to one or both ends { source|dest|both }
- enum **reject.control**: send icmp unreachable(s) { network|host|port|all }

6.3 rewrite

What: overwrite packet contents

Type: ips_action

7 IPS Option Modules

IPS options are the building blocks of IPS rules.

7.1 ack

What: rule option to match on TCP ack numbers

Type: ips_option

Configuration:

- string **ack.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*

7.2 asn1

What: rule option for asn1 detection

Type: ips_option

Configuration:

- implied **asn1.bitstring_overflow**: Detects invalid bitstring encodings that are known to be remotely exploitable.
- implied **asn1.double_overflow**: Detects a double ASCII encoding that is larger than a standard buffer.
- implied **asn1.print**: <>max | <max | >min
- int **asn1.oversize_length**: Compares ASN.1 type lengths with the supplied argument. { 0: }
- int **asn1.absolute_offset**: Absolute offset from the beginning of the packet. { 0: }
- int **asn1.relative_offset**: relative offset from the cursor.

7.3 base64_decode

What: rule option to decode base64 data - must be used with base64_data option

Type: ips_option

Configuration:

- int **base64_decode.bytes**: Number of base64 encoded bytes to decode. { 1: }
- int **base64_decode.offset** = 0: Bytes past start of buffer to start decoding. { 0: }
- implied **base64_decode.relative**: Apply offset to cursor instead of start of buffer.

7.4 bufferlen

What: rule option to check length of current buffer

Type: ips_option

Configuration:

- string **bufferlen.~range**: len | min<>max | <max | >min

7.5 byte_extract

What: rule option to convert data to an integer variable

Type: ips_option

Configuration:

- int **byte_extract.~count**: number of bytes to pick up from the buffer { 1:10 }
- int **byte_extract.~offset**: number of bytes into the buffer to start processing { -65535:65535 }
- string **byte_extract.~name**: name of the variable that will be used in other rule options
- implied **byte_extract.relative**: offset from cursor instead of start of buffer
- int **byte_extract.multiplier** = 1: scale extracted value by given amount { 1:65535 }
- int **byte_extract.align** = 0: round the number of converted bytes up to the next 2- or 4-byte boundary { 0:4 }
- implied **byte_extract.big**: big endian
- implied **byte_extract.little**: little endian
- implied **byte_extract.dce**: dcerpc2 determines endianness
- implied **byte_extract.string**: convert from string
- implied **byte_extract.hex**: convert from hex string
- implied **byte_extract.oct**: convert from octal string
- implied **byte_extract.dec**: convert from decimal string

7.6 byte_jump

What: rule option to move the detection cursor

Type: ips_option

Configuration:

- int **byte_jump.~count**: number of bytes to pick up from the buffer { 1:10 }
- string **byte_jump.~offset**: variable name or number of bytes into the buffer to start processing
- implied **byte_jump.relative**: offset from cursor instead of start of buffer
- implied **byte_jump.from_beginning**: jump from start of buffer instead of cursor
- int **byte_jump.multiplier** = 1: scale extracted value by given amount { 1:65535 }
- int **byte_jump.align** = 0: round the number of converted bytes up to the next 2- or 4-byte boundary { 0:4 }
- int **byte_jump.post_offset** = 0: also skip forward or backwards (positive of negative value) this number of bytes { -65535:65535 }
- implied **byte_jump.big**: big endian
- implied **byte_jump.little**: little endian
- implied **byte_jump.dce**: dcerpc2 determines endianness
- implied **byte_jump.string**: convert from string
- implied **byte_jump.hex**: convert from hex string
- implied **byte_jump.oct**: convert from octal string
- implied **byte_jump.dec**: convert from decimal string

7.7 byte_test

What: rule option to convert data to integer and compare

Type: ips_option

Configuration:

- int **byte_test.~count**: number of bytes to pick up from the buffer { 1:10 }
- string **byte_test.~operator**: variable name or number of bytes into the buffer to start processing
- string **byte_test.~compare**: variable name or value to test the converted result against
- string **byte_test.~offset**: variable name or number of bytes into the payload to start processing
- implied **byte_test.relative**: offset from cursor instead of start of buffer
- implied **byte_test.big**: big endian
- implied **byte_test.little**: little endian
- implied **byte_test.dce**: dcerpc2 determines endianness
- implied **byte_test.string**: convert from string
- implied **byte_test.hex**: convert from hex string
- implied **byte_test.oct**: convert from octal string
- implied **byte_test.dec**: convert from decimal string

7.8 classtype

What: general rule option for rule classification

Type: ips_option

Configuration:

- string **classtype.~**: classification for this rule

7.9 content

What: payload rule option for basic pattern matching

Type: ips_option

Configuration:

- string **content.~data**: data to match
- implied **content.nocase**: case insensitive match
- implied **content.fast_pattern**: use this content in the fast pattern matcher instead of the content selected by default
- int **content.fast_pattern_offset** = 0: number of leading characters of this content the fast pattern matcher should exclude { 0: }
- int **content.fast_pattern_length**: maximum number of characters from this content the fast pattern matcher should use { 1: }
- string **content.offset**: var or number of bytes from start of buffer to start search
- string **content.depth**: var or maximum number of bytes to search from beginning of buffer
- string **content.distance**: var or number of bytes from cursor to start search
- string **content.within**: var or maximum number of bytes to search from cursor

7.10 cvs

What: payload rule option for detecting specific attacks

Type: ips_option

Configuration:

- implied **cvs.invalid-entry**: looks for an invalid Entry string

7.11 detection_filter

What: rule option to require multiple hits before a rule generates an event

Type: ips_option

Configuration:

- enum **detection_filter.track**: track hits by source or destination IP address { by_src | by_dst }
- int **detection_filter.count**: hits in interval before allowing the rule to fire { 1: }
- int **detection_filter.seconds**: length of interval to count hits { 1: }

7.12 dnp3_data

What: sets the cursor to dnp3 data

Type: ips_option

7.13 dnp3_func

What: detection option to check dnp3 function code

Type: ips_option

Configuration:

- string **dnp3_func.~**: match dnp3 function code or name

7.14 dnp3_ind

What: detection option to check dnp3 indicator flags

Type: ips_option

Configuration:

- string **dnp3_ind.~**: match given dnp3 indicator flags

7.15 dnp3_obj

What: detection option to check dnp3 object headers

Type: ips_option

Configuration:

- int **dnp3_obj.group** = 0: match given dnp3 object header group { 0:255 }
- int **dnp3_obj.var** = 0: match given dnp3 object header var { 0:255 }

7.16 dsize

What: rule option to test payload size

Type: ips_option

Configuration:

- string **dsize.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*

7.17 file_data

What: rule option to set detection cursor to file data

Type: ips_option

7.18 flags

What: rule option to test TCP control flags

Type: ips_option

Configuration:

- string **flags.~test_flags**: these flags are tested
- string **flags.~mask_flags**: these flags are don't cares

7.19 flow

What: rule option to check session properties

Type: ips_option

Configuration:

- implied **flow.to_client**: match on server responses
- implied **flow.to_server**: match on client requests
- implied **flow.from_client**: same as to_server
- implied **flow.from_server**: same as to_client
- implied **flow.established**: match only during data transfer phase
- implied **flow.not_established**: match only outside data transfer phase
- implied **flow.stateless**: match regardless of stream state
- implied **flow.no_stream**: match on raw packets only
- implied **flow.only_stream**: match on reassembled packets only
- implied **flow.no_frag**: match on raw packets only
- implied **flow.only_frag**: match on defragmented packets only

7.20 flowbits

What: rule option to set and test arbitrary boolean flags

Type: ips_option

Configuration:

- string **flowbits.~command**: set|reset|isset|etc.
- string **flowbits.~arg1**: bits or group
- string **flowbits.~arg2**: group if arg1 is bits

7.21 fragbits

What: rule option to test IP frag flags

Type: ips_option

Configuration:

- string **fragbits.~flags**: these flags are tested

7.22 fragoffset

What: rule option to test IP frag offset

Type: ips_option

Configuration:

- string **fragoffset.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*

7.23 gid

What: rule option specifying rule generator

Type: ips_option

Configuration:

- int **gid.~**: generator id { 1: }

7.24 gtp_info

What: rule option to check gtp info element

Type: ips_option

Configuration:

- string **gtp_info.~**: info element to match

7.25 gtp_type

What: rule option to check gtp types

Type: ips_option

Configuration:

- string **gtp_type.~**: list of types to match

7.26 gtp_version

What: rule option to check gtp version

Type: ips_option

Configuration:

- int **gtp_version.~**: version to match { 0:2 }

7.27 http_client_body

What: rule option to set the detection cursor to the request body

Type: ips_option

7.28 http_cookie

What: rule option to set the detection cursor to the HTTP cookie

Type: ips_option

7.29 http_header

What: rule option to set the detection cursor to the normalized header(s)

Type: ips_option

Configuration:

- string **http_header.~name**: restrict to given header

7.30 http_method

What: rule option to set the detection cursor to the HTTP request method

Type: ips_option

7.31 http_raw_cookie

What: rule option to set the detection cursor to the unnormalized cookie

Type: ips_option

7.32 http_raw_header

What: rule option to set the detection cursor to the unnormalized headers

Type: ips_option

7.33 http_raw_uri

What: rule option to set the detection cursor to the unnormalized URI

Type: ips_option

7.34 http_stat_code

What: rule option to set the detection cursor to the HTTP status code

Type: ips_option

7.35 http_stat_msg

What: rule option to set the detection cursor to the HTTP status message

Type: ips_option

7.36 http_uri

What: rule option to set the detection cursor to the normalized URI buffer

Type: ips_option

7.37 icmp_id

What: rule option to check ICMP ID

Type: ips_option

Configuration:

- string **icmp_id.~range**: check if icmp id is *id* | *min*<>*max* | <*max* | >*min*

7.38 icmp_seq

What: rule option to check ICMP sequence number

Type: ips_option

Configuration:

- string **icmp_seq.~range**: check if icmp sequence number is *seq* | *min*<>*max* | <*max* | >*min*

7.39 icode

What: rule option to check ICMP code

Type: ips_option

Configuration:

- string **icode.~range**: check if ICMP code is *code* | *min*<>*max* | <*max* | >*min*

7.40 id

What: rule option to check the IP ID field

Type: ips_option

Configuration:

- string **id.~range**: check if the IP ID is *id* | *min*<>*max* | <*max* | >*min*

7.41 ip_proto

What: rule option to check the IP protocol number

Type: ips_option

Configuration:

- string **ip_proto.~proto**: [!|>|<] name or number

7.42 ipopts

What: rule option to check for IP options

Type: ips_option

Configuration:

- select **ipopts.~opt**: output format { rr|eol|nop|ts|sec|esec|lsrr|lsrre|ssrr|satid|any }

7.43 isdataat

What: rule option to check for the presence of payload data

Type: ips_option

Configuration:

- string **isdataat.~length**: num | !num
- implied **isdataat.relative**: offset from cursor instead of start of buffer

7.44 itype

What: rule option to check ICMP type

Type: ips_option

Configuration:

- string **itype.~range**: check if icmp type is *type* | *min*<>*max* | <*max* | >*min*

7.45 md5

What: payload rule option for hash matching

Type: ips_option

Configuration:

- string **md5.~hash**: data to match
- int **md5.length**: number of octets in plain text { 1:65535 }
- string **md5.offset**: var or number of bytes from start of buffer to start search
- implied **md5.relative** = false: offset from cursor instead of start of buffer

7.46 metadata

What: rule option for conveying arbitrary name, value data within the rule text

Type: ips_option

Configuration:

- string **metadata.service**: service name
- string **metadata.***: additional parameters not used by snort

7.47 modbus_data

What: rule option to set cursor to modbus data

Type: ips_option

7.48 modbus_func

What: rule option to check modbus function code

Type: ips_option

Configuration:

- string **modbus_func.~**: function code to match

7.49 modbus_unit

What: rule option to check modbus unit ID

Type: ips_option

Configuration:

- int **modbus_unit.~**: modbus unit ID { 0:255 }

7.50 msg

What: rule option summarizing rule purpose output with events

Type: ips_option

Configuration:

- string **msg.~**: message describing rule

7.51 pcre

What: rule option for matching payload data with pcre

Type: ips_option

Configuration:

- string **pcre.~re**: Snort regular expression

7.52 pkt_data

What: rule option to set the detection cursor to the normalized packet data

Type: ips_option

7.53 pkt_num

What: alert on raw packet number

Type: ips_option

Configuration:

- string **pkt_num.~range**: check if packet number is in given range

7.54 priority

What: rule option for prioritizing events

Type: ips_option

Configuration:

- int **priority.~**: relative severity level; 1 is highest priority { 1: }

7.55 raw_data

What: rule option to set the detection cursor to the raw packet data

Type: ips_option

7.56 reference

What: rule option to indicate relevant attack identification system

Type: ips_option

Configuration:

- string **reference.~scheme**: reference scheme
- string **reference.~id**: reference id

7.57 regex

What: rule option for matching payload data with hyperscan regex

Type: ips_option

Configuration:

- string **regex.~re**: hyperscan regular expression
- implied **regex.nocase**: case insensitive match
- implied **regex.dotall**: matching a . will not exclude newlines
- implied **regex.multiline**: ^ and $ anchors match any newlines in data
- implied **regex.relative**: start search from end of last match instead of start of buffer

7.58 rem

What: rule option to convey an arbitrary comment in the rule body

Type: ips_option

Configuration:

- string **rem.~**: comment

7.59 replace

What: rule option to overwrite payload data; use with rewrite action

Type: ips_option

Configuration:

- string **replace.~**: byte code to replace with

7.60 rev

What: rule option to indicate current revision of signature

Type: ips_option

Configuration:

- int **rev.~**: revision { 1: }

7.61 rpc

What: rule option to check SUNRPC CALL parameters

Type: ips_option

Configuration:

- string **rpc.~app**: application number
- string **rpc.~ver**: version number or * for any
- string **rpc.~proc**: procedure number or * for any

7.62 seq

What: rule option to check TCP sequence number

Type: ips_option

Configuration:

- string **seq.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*

7.63 session

What: rule option to check user data from TCP sessions

Type: ips_option

Configuration:

- enum **session.~mode**: output format { printable|binary|all }

7.64 sha256

What: payload rule option for hash matching

Type: ips_option

Configuration:

- string **sha256.~hash**: data to match
- int **sha256.length**: number of octets in plain text { 1:65535 }
- string **sha256.offset**: var or number of bytes from start of buffer to start search
- implied **sha256.relative** = false: offset from cursor instead of start of buffer

7.65 sha512

What: payload rule option for hash matching

Type: ips_option

Configuration:

- string **sha512.~hash**: data to match
- int **sha512.length**: number of octets in plain text { 1:65535 }
- string **sha512.offset**: var or number of bytes from start of buffer to start search
- implied **sha512.relative** = false: offset from cursor instead of start of buffer

7.66 sid

What: rule option to indicate signature number

Type: ips_option

Configuration:

- int **sid.~**: signature id { 1: }

7.67 sip_body

What: rule option to set the detection cursor to the request body

Type: ips_option

7.68 sip_header

What: rule option to set the detection cursor to the SIP header buffer

Type: ips_option

7.69 sip_method

What: detection option for sip stat code

Type: ips_option

Configuration:

- string **sip_method.*method**: sip method

7.70 sip_stat_code

What: detection option for sip stat code

Type: ips_option

Configuration:

- int **sip_stat_code.*code**: stat code { 1:999 }

7.71 so

What: rule option to call custom eval function

Type: ips_option

Configuration:

- string **so.~func**: name of eval function

7.72 soid

What: rule option to specify a shared object rule ID

Type: ips_option

Configuration:

- string **soid.~**: SO rule ID has <gid>|<sid> format, like 3|12345

7.73 ssl_state

What: detection option for ssl state

Type: ips_option

Configuration:

- implied **ssl_state.client_hello**: check for client hello
- implied **ssl_state.server_hello**: check for server hello
- implied **ssl_state.client_keyx**: check for client keyx
- implied **ssl_state.server_keyx**: check for server keyx
- implied **ssl_state.unknown**: check for unknown record
- implied **ssl_state.!client_hello**: check for records that are not client hello
- implied **ssl_state.!server_hello**: check for records that are not server hello
- implied **ssl_state.!client_keyx**: check for records that are not client keyx
- implied **ssl_state.!server_keyx**: check for records that are not server keyx
- implied **ssl_state.!unknown**: check for records that are not unknown

7.74 ssl_version

What: detection option for ssl version

Type: ips_option

Configuration:

- implied **ssl_version.sslv2**: check for sslv2
- implied **ssl_version.sslv3**: check for sslv3
- implied **ssl_version.tls1.0**: check for tls1.0
- implied **ssl_version.tls1.1**: check for tls1.1
- implied **ssl_version.tls1.2**: check for tls1.2
- implied **ssl_version.!sslv2**: check for records that are not sslv2
- implied **ssl_version.!sslv3**: check for records that are not sslv3
- implied **ssl_version.!tls1.0**: check for records that are not tls1.0
- implied **ssl_version.!tls1.1**: check for records that are not tls1.1
- implied **ssl_version.!tls1.2**: check for records that are not tls1.2

7.75 stream_reassemble

What: detection option for stream reassembly control

Type: ips_option

Configuration:

- enum **stream_reassemble.action**: stop or start stream reassembly { disable|enable }
- enum **stream_reassemble.direction**: action applies to the given direction(s) { client|server|both }
- implied **stream_reassemble.noalert**: don't alert when rule matches
- implied **stream_reassemble.fastpath**: optionally whitelist the remainder of the session

7.76 stream_size

What: detection option for stream size checking

Type: ips_option

Configuration:

- string **stream_size.~range**: size for comparison
- enum **stream_size.~direction**: compare applies to the given direction(s) { either|to_server|to_client|both }

7.77 tag

What: rule option to log additional packets

Type: ips_option

Configuration:

- enum **tag.~**: log all packets in session or all packets to or from host { session|host_src|host_dst }
- int **tag.packets**: tag this many packets { 1: }
- int **tag.seconds**: tag for this many seconds { 1: }
- int **tag.bytes**: tag for this many bytes { 1: }

7.78 tos

What: rule option to check type of service field

Type: ips_option

Configuration:

- string **tos.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*

7.79 ttl

What: rule option to check time to live field

Type: ips_option

Configuration:

- string **ttl.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*

7.80 urg

What: detection for TCP urgent pointer

Type: ips_option

Configuration:

- string **urg.~range**: check if urgent offset is min<>max | <max | >min

7.81 window

What: rule option to check TCP window field

Type: ips_option

Configuration:

- string **window.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*

8 Search Engine Modules

Search engines perform multipattern searching of packets and payload to find rules that should be evaluated. There are currently no specific modules, although there are several search engine plugins. Related configuration is done with the basic detection module.

9 SO Rule Modules

SO rules are dynamic rules that require custom coding to perform detection not possible with the existing rule options. These rules typically do not have associated modules.

10 Logger Modules

All output of events and packets is done by Loggers.

10.1 alert_csv

What: output event in csv format

Type: logger

Configuration:

- bool **alert_csv.file** = false: output to alert_csv.txt instead of stdout
- multi **alert_csv.fields** = timestamp pkt_num proto pkt_gen dgm_len dir src_ap dst_ap rule action: selected fields will be output in given order left to right { action | dir | dgm_len | dst_addr | dst_ap | dst_port | eth_dst | eth_len | eth_src | eth_type | gid | icmp_code | icmp_id | icmp_seq | icmp_type | iface | ip_id | ip_len | msg | pkt_gen | pkt_num | proto | rev | rule | sid | src_addr | src_ap | src_port | tcp_ack | tcp_flags | tcp_len | tcp_seq | tcp_win | timestamp | tos | ttl | udp_len }
- int **alert_csv.limit** = 0: set limit (0 is unlimited) { 0: }
- string **alert_csv.separator** = , : separate fields with this character sequence
- enum **alert_csv.units** = B: bytes | KB | MB | GB { B | K | M | G }

10.2 alert_ex

What: output gid:sid:rev for alerts

Type: logger

Configuration:

- bool **alert_ex.upper** = false: true/false → convert to upper/lower case

10.3 alert_fast

What: output event with brief text format

Type: logger

Configuration:

- bool **alert_fast.file** = false: output to alert_fast.txt instead of stdout

- bool **alert_fast.packet** = false: output packet dump with alert
- int **alert_fast.limit** = 0: set limit (0 is unlimited) { 0: }
- enum **alert_fast.units** = B: bytes | KB | MB | GB { B | K | M | G }

10.4 alert_full

What: output event with full packet dump

Type: logger

Configuration:

- bool **alert_full.file** = false: output to alert_full.txt instead of stdout
- int **alert_full.limit** = 0: set limit (0 is unlimited) { 0: }
- enum **alert_full.units** = B: limit is in bytes | KB | MB | GB { B | K | M | G }

10.5 alert_syslog

What: output event to syslog

Type: logger

Configuration:

- enum **alert_syslog.facility** = auth: part of priority applied to each message { auth | authpriv | daemon | user | local0 | local1 | local2 | local3 | local4 | local5 | local6 | local7 }
- enum **alert_syslog.level** = info: part of priority applied to each message { emerg | alert | crit | err | warning | notice | info | debug }
- multi **alert_syslog.options**: used to open the syslog connection { cons | ndelay | perror | pid }

10.6 log_codecs

What: log protocols in packet by layer

Type: logger

Configuration:

- bool **log_codecs.file** = false: output to log_codecs.txt instead of stdout
- bool **log_codecs.msg** = false: include alert msg

10.7 log_hext

What: output payload suitable for daq hext

Type: logger

Configuration:

- bool **log_hext.file** = false: output to log_hext.txt instead of stdout
- bool **log_hext.raw** = false: output all full packets if true, else just TCP payload
- int **log_hext.limit** = 0: set limit (0 is unlimited) { 0: }
- enum **log_hext.units** = B: bytes | KB | MB | GB { B | K | M | G }
- int **log_hext.width** = 20: set line width (0 is unlimited) { 0: }

10.8 log_pcap

What: log packet in pcap format

Type: logger

Configuration:

- int **log_pcap.limit** = 0: set limit (0 is unlimited) { 0: }
- enum **log_pcap.units** = B: bytes | KB | MB | GB { B | K | M | G }

10.9 unified2

What: output event and packet in unified2 format file

Type: logger

Configuration:

- int **unified2.limit** = 0: set limit (0 is unlimited) { 0: }
- enum **unified2.units** = B: limit multiplier { B | K | M | G }
- bool **unified2.nostamp** = true: append file creation time to name (in Unix Epoch format)
- bool **unified2.mpls_event_types** = false: include mpls labels in events
- bool **unified2.vlan_event_types** = false: include vlan IDs in events

11 DAQ Modules

The Data AcQuisition library (DAQ), provides pluggable packet I/O. The DAQ replaces direct calls to libraries like libpcap with an abstraction layer that facilitates operation on a variety of hardware and software interfaces without requiring changes to Snort. It is possible to select the DAQ type and mode when invoking Snort to perform pcap readback or inline operation, etc. The DAQ library may be useful for other packet processing applications and the modular nature allows you to build new modules for other platforms.

The DAQ library is provided as an external package on snort.org. There are a few additional modules provided with Snort++. This section summarizes the important things you need to know to use these DAQ modules. There are also 3rd DAQ modules available.

11.1 Building the DAQ Library and DAQ Modules

The DAQ is bundled with Snort but must be built first using these steps:

```
./configure
make
sudo make install
```

This will build and install both static and dynamic DAQ modules.

Note that pcap >= 1.0.0 is required. pcap 1.1.1 is available at the time of this writing and is recommended.

Also, libdnet is required for IPQ and NFQ DAQs. If you get a relocation error trying to build those DAQs, you may need to reinstall libdnet and configure it with something like this:

```
./configure "CFLAGS=-fPIC -g -O2"
```

You may also experience problems trying to find the dynamic dnet library because it isn't always named properly. Try creating a link to the shared library (identified by its .x or .x.y etc. extension) with the same name but with ".so" inserted as follows:

```
$ ln -s libdnet.1.1 libdnet.so.1.1
$ ldconfig -Rv /usr/local/lib 2>&1 | grep dnet
  Adding /usr/local/lib/libdnet.so.1.1
```

Alternatively, you should be able to fix both issues as follows:

```
libtoolize --copy --force
aclocal -I config
autoheader
autoconf
automake --foreign
```

When the DAQ library is built, both static and dynamic flavors will be generated. The various DAQ modules will be built if the requisite headers and libraries are available. You can disable individual modules, etc. with options to configure. For the complete list of configure options, run:

```
./configure --help
```

11.2 PCAP Module

pcap is the default DAQ. If snort is run w/o any DAQ arguments, it will operate as it always did using this module. These are equivalent:

```
./snort -i <device>
./snort -r <file>
```

```
./snort --daq pcap --daq-mode passive -i <device>
./snort --daq pcap --daq-mode read-file -r <file>
```

You can specify the buffer size pcap uses with:

```
./snort --daq pcap --daq-var buffer_size=<#bytes>
```

- The pcap DAQ does not count filtered packets. *

11.3 AFPACKET Module

afpacket functions similar to the pcap DAQ but with better performance:

```
./snort --daq afpacket -i <device>
        [--daq-var buffer_size_mb=<#MB>]
        [--daq-var debug]
```

If you want to run afpacket in inline mode, you must craft the device string as one or more interface pairs, where each member of a pair is separated by a single colon and each pair is separated by a double colon like this:

```
eth0:eth1
```

or this:

```
eth0:eth1::eth2:eth3
```

By default, the afpacket DAQ allocates 128MB for packet memory. You can change this with:

```
--daq-var buffer_size_mb=<#MB>
```

Note that the total allocated is actually higher, here's why. Assuming the default packet memory with a snaplen of 1518, the numbers break down like this:

- The frame size is 1518 (snaplen) + the size of the AFPacket header (66 bytes) = 1584 bytes.
- The number of frames is 128 MB / 1518 = 84733.
- The smallest block size that can fit at least one frame is 4 KB = 4096 bytes @ 2 frames per block.
- As a result, we need 84733 / 2 = 42366 blocks.
- Actual memory allocated is 42366 * 4 KB = 165.5 MB.

Note
Linux kernel version 2.6.31 or higher is required for the AFPacket DAQ module due to its dependency on both TPACKET v2 and PACKET_TX_RING support.

11.4 NFQ Module

NFQ is the new and improved way to process iptables packets:

```
./snort --daq nfq \
    [--daq-var device=<dev>] \
    [--daq-var proto=<proto>] \
    [--daq-var queue=<qid>]

<dev> ::= ip | eth0, etc; default is IP injection
<proto> ::= ip4 | ip6 |; default is ip4
<qid> ::= 0..65535; default is 0
```

This module can not run unprivileged so ./snort -u -g will produce a warning and won't change user or group.

Notes on iptables are given below.

11.5 IPQ Module

IPQ is the old way to process iptables packets. It replaces the inline version available in pre-2.9 versions built with this:

```
./configure --enable-inline
```

Note that layer 2 resets are not supported with the IPQ DAQ:

```
config layer2resets[: <mac>]
```

Start the IPQ DAQ as follows:

```
./snort --daq ipq \
    [--daq-var device=<dev>] \
    [--daq-var proto=<proto>] \

<dev> ::= ip | eth0, etc; default is IP injection
<proto> ::= ip4 | ip6; default is ip4
```

This module can not run unprivileged so ./snort -u -g will produce a warning and won't change user or group.

Notes on iptables are given below.

11.6 IPFW Module

IPFW is available for BSD systems. It replaces the inline version available in pre-2.9 versions built with this:

```
./configure --enable-ipfw
```

This command line argument is no longer supported:

```
./snort -J <port#>
```

Instead, start Snort like this:

```
./snort --daq ipfw [--daq-var port=<port>]

<port> ::= 1..65535; default is 8000
```

- IPFW only supports ip4 traffic.

Notes on FreeBSD and OpenBSD are given below.

11.7 Dump Module

The dump DAQ allows you to test the various inline mode features available in 2.9 Snort like injection and normalization.

```
./snort -i <device> --daq dump
./snort -r <pcap> --daq dump
```

By default a file named inline-out.pcap will be created containing all packets that passed through or were generated by snort. You can optionally specify a different name.

```
./snort --daq dump --daq-var file=<name>
```

dump uses the pcap daq for packet acquisition. It therefore does not count filtered packets (a pcap limitation).

Note that the dump DAQ inline mode is not an actual inline mode. Furthermore, you will probably want to have the pcap DAQ acquire in another mode like this:

```
./snort -r <pcap> -Q --daq dump --daq-var load-mode=read-file
./snort -i <device> -Q --daq dump --daq-var load-mode=passive
```

11.8 Netmap Module

The netmap project is a framework for very high speed packet I/O. It is available on both FreeBSD and Linux with varying amounts of preparatory setup required. Specific notes for each follow.

```
./snort --daq netmap -i <device>
        [--daq-var debug]
```

If you want to run netmap in inline mode, you must craft the device string as one or more interface pairs, where each member of a pair is separated by a single colon and each pair is separated by a double colon like this:

```
em1:em2
```

or this:

```
em1:em2::em3:em4
```

Inline operation performs Layer 2 forwarding with no MAC filtering, akin to the AFPacket module's behavior. All packets received on one interface in an inline pair will be forwarded out the other interface unless dropped by the reader and vice versa.

Important
The interfaces will need to be up and in promiscuous mode in order to function (*ifconfig em1 up promisc*). The DAQ module does not currently do either of these configuration steps for itself.

11.8.1 FreeBSD

In FreeBSD 10.0, netmap has been integrated into the core OS. In order to use it, you must recompile your kernel with the line

```
device netmap
```

added to your kernel config.

11.8.2 Linux

You will need to download the netmap source code from the project's repository:

```
https://code.google.com/p/netmap/
```

Follow the instructions on the project's homepage for compiling and installing the code:

```
http://info.iet.unipi.it/~luigi/netmap/
```

It will involve a standalone kernel module (netmap_lin) as well as patching and rebuilding the kernel module used to drive your network adapters. The following drivers are supported under Linux at the time of writing (June 2014):

```
e1000
e1000e
forcedeth
igb
ixgbe
r8169
virtio
```

TODO:

- Support for attaching to only a single ring (queue) on a network adapter.
- Support for VALE and netmap pipes.

11.9 Notes on iptables

These notes are just a quick reminder that you need to set up iptables to use the IPQ or NFQ DAQs. Doing so may cause problems with your network so tread carefully. The examples below are intentionally incomplete so please read the related documentation first.

Here is a blog post by Marty for historical reference:

```
http://archives.neohapsis.com/archives/snort/2000-11/0394.html
```

You can check this out for queue sizing tips:

```
http://www.inliniac.net/blog/2008/01/23/improving-snort_inlines-nfq-performance. ↩
    html
```

You might find useful IPQ info here:

```
http://snort-inline.sourceforge.net/
```

Use this to examine your iptables:

```
sudo /sbin/iptables -L
```

Use something like this to set up NFQ:

```
sudo /sbin/iptables
    -I <table> [<protocol stuff>] [<state stuff>]
    -j NFQUEUE --queue-num 1
```

Use something like this to set up IPQ:

```
sudo iptables -I FORWARD -j QUEUE
```

Use something like this to "disconnect" snort:

```
sudo /sbin/iptables -D <table> <rule pos>
```

Be sure to start Snort prior to routing packets through NFQ with iptables. Such packets will be dropped until Snort is started.

The queue-num is the number you must give Snort.

If you are running on a system with both NFQ and IPQ support, you may experience some start-up failures of the sort:

The solution seems to be to remove both modules from the kernel like this:

```
modprobe -r nfnetlink_queue
modprobe -r ip_queue
```

and then install the module you want:

```
modprobe ip_queue
```

or:

```
modprobe nfnetlink_queue
```

These DAQs should be run with a snaplen of 65535 since the kernel defrags the packets before queuing. Also, no need to configure frag3.

11.10 Notes on FreeBSD::IPFW

Check the online manual at:

```
http://www.freebsd.org/doc/handbook/firewalls-ipfw.html.
```

Here is a brief example to divert icmp packets to Snort at port 8000:

To enable support for divert sockets, place the following lines in the kernel configuration file:

```
options IPFIREWALL
options IPDIVERT
```

(The file in this case was: /usr/src/sys/i386/conf/GENERIC; which is platform dependent.)

You may need to also set these to use the loadable kernel modules:

```
/etc/rc.conf:
firewall_enable="YES"

/boot/loader.conf:
ipfw_load="YES"
ipdivert_load="YES"

$ dmesg | grep ipfw
ipfw2 (+ipv6) initialized, divert loadable, nat loadable, rule-based
forwarding disabled, default to deny, logging disabled

$ kldload -v ipdivert
Loaded ipdivert, id=4

$ ipfw add 75 divert 8000 icmp from any to any
00075 divert 8000 icmp from any to any

$ ipfw list
...
00075 divert 8000 icmp from any to any
00080 allow icmp from any to any
...
```

- Note that on FreeBSD, divert sockets don't work with bridges!

Please refer to the following articles for more information:

- https://forums.snort.org/forums/support/topics/snort-inline-on-freebsd-ipfw
- http://freebsd.rogness.net/snort_inline/

NAT gateway can be used with divert sockets if the network environment is conducive to using NAT.

The steps to set up NAT with ipfw are as follows:

1. Set up NAT with two interface em0 and em1 by adding the following to /etc/rc.conf. Here em0 is connected to external network and em1 to host-only LAN.

   ```
   gateway_enable="YES"
   natd_program="/sbin/natd"    # path to natd
   natd_enable="YES"            # Enable natd (if firewall_enable == YES)
   natd_interface="em0"        # Public interface or IP Address
   natd_flags="-dynamic"        # Additional flags
   defaultrouter=""
   ifconfig_em0="DHCP"
   ifconfig_em1="inet 192.168.1.2 netmask 255.255.255.0"
   firewall_enable="YES"
   firewall_script="/etc/rc.firewall"
   firewall_type="simple"
   ```

2. Add the following divert rules to divert packets to Snort above and below the NAT rule in the "Simple" section of /etc/rc.firewall.

```
...
# Inspect outbound packets (those arriving on "inside" interface)
# before NAT translation.
${fwcmd} add divert 8000 all from any to any in via ${iif}
case ${natd_enable} in
[Yy][Ee][Ss])
    if [ -n "${natd_interface}" ]; then
        ${fwcmd} add divert natd all from any to any via ${natd_interface}
    fi
    ;;
esac
...
# Inspect inbound packets (those arriving on "outside" interface)
# after NAT translation that aren't blocked for other reasons,
# after the TCP "established" rule.
${fwcmd} add divert 8000 all from any to any in via ${oif}
```

11.11 Notes on OpenBSD::IPFW

OpenBSD supports divert sockets as of 4.7, so we use the ipfw DAQ.

Here is one way to set things up:

1. Configure the system to forward packets:

   ```
   $ sysctl net.inet.ip.forwarding=1
   $ sysctl net.inet6.ip6.forwarding=1
   ```

   ```
   (You can also put that in /etc/sysctl.conf to enable on boot.)
   ```

2. Set up interfaces

   ```
   $ dhclient vic1
   $ dhclient vic2
   ```

3. Set up packet filter rules:

   ```
   $ echo "pass out on vic1 divert-packet port 9000 keep-state" > rules.txt
   $ echo "pass out on vic2 divert-packet port 9000 keep-state" >> rules.txt
   ```

   ```
   $ pfctl -v -f rules.txt
   ```

4. Analyze packets diverted to port 9000:

   ```
   $ ./snort --daq ipfw --daq-var port=9000
   ```

   - Note that on OpenBSD, divert sockets don't work with bridges!

11.12 Socket Module

The socket module provides provides a stream socket server that will accept up to 2 simultaneous connections and bridge them together while also passing data to Snort++ for inspection. The first connection accepted is considered the client and the second connection accepted is considered the server. If there is only one connection, stream data can't be forwarded but it is still inspected.

Each read from a socket of up to snaplen bytes is passed as a packet to Snort++ along with a DAQ_SktHdr_t pointer in DAQ_PktHdr_t→priv_ptr. DAQ_SktHdr_t conveys IP4 address, ports, protocol, and direction. Socket packets can be configured to be TCP or UDP. The socket DAQ can be operated in inline mode and is able to block packets.

The socket DAQ uses DLT_SOCKET and requires that Snort++ load the socket codec which is included in the extra package.

To use the socket DAQ, start Snort++ like this:

```
./snort --plugin-path /path/to/lib/snort_extra \
    --daq socket [--daq-var port=<port>] [--daq-var proto=<proto>] [-Q]

<port> ::= 1..65535; default is 8000
<proto> ::= tcp | udp
```

- This module only supports ip4 traffic.
- This module is only supported by Snort++. It is not compatible with Snort.
- This module is primarily for development and test.

11.13 File Module

The file module provides the ability to process files directly w/o having to extract them from pcaps. Use the file module with Snort's stream_file to get file type identification and signature services. The usual IPS detection and logging etc. is available too.

You can process all the files in a directory recursively using 8 threads with these Snort options:

```
--pcap-dir path -z 8
```

- This module is only supported by Snort++. It is not compatible with Snort.
- This module is primarily for development and test.

11.14 Hext Module

The hext module generates packets suitable for processing by Snort from hex/plain text. Raw packets include full headers and are processed normally. Otherwise the packets contain only payload and are accompanied with flow information (4-tuple) suitable for processing by stream_user.

The first character of the line determines it's purpose:

```
'$' command
'#' comment
'"' quoted string packet data
'x' hex packet data
' ' empty line separates packets
```

The available commands are:

```
$client <ip4> <port>
$server <ip4> <port>

$packet -> client
$packet -> server

$packet <addr> <port> -> <addr> <port>
```

Client and server are determined as follows. $packet → client indicates to the client (from server) and $packet → server indicates a packet to the server (from client). $packet followed by a 4-tuple uses the heuristic that the client is the side with the lower port number.

The default client and server are 192.168.1.1 12345 and 10.1.2.3 80 respectively. $packet commands with a 4-tuple do not change client and server set with the other $packet commands.

$packet commands should be followed by packet data, which may contain any combination of hex and strings. Data for a packet ends with the next command or a blank line. Data after a blank line will start another packet with the same tuple as the prior one.

Strings may contain the following escape sequences:

```
\r = 0x0D = carriage return
\n = 0x0A = new line
\t = 0x09 = tab
\\ = 0x5C = \
```

Format your input carefully; there is minimal error checking and little tolerance for arbitrary whitespace. You can use Snort's -L hext option to generate hext input from a pcap.

- This module only supports ip4 traffic.
- This module is only supported by Snort++. It is not compatible with Snort.
- This module is primarily for development and test.

The hext DAQ also supports a raw mode which is activated by setting the data link type. For example, you can input full ethernet packets with --daq-var dlt=1 (Data link types are defined in the DAQ include sfbpf_dlt.h.) Combine that with the hext logger in raw mode for a quick (and dirty) way to edit pcaps. With --lua "log_hext = { raw = true }", the hext logger will dump the full packet in a way that can be read by the hext DAQ in raw mode. Here is an example:

```
# 3 [96]

x02 09 08 07 06 05 02 01 02 03 04 05 08 00 45 00 00 52 00 03  # ..............E..R ↩
    ..
x00 00 40 06 5C 90 0A 01 02 03 0A 09 08 07 BD EC 00 50 00 00  # ..@.\............P ↩
    ..
x00 02 00 00 00 02 50 10 20 00 8A E1 00 00 47 45 54 20 2F 74  # ......P.  .....GET ↩
     /t
x72 69 67 67 65 72 2F 31 20 48 54 54 50 2F 31 2E 31 0D 0A 48  # rigger/1 HTTP ↩
    /1.1..H
x6F 73 74 3A 20 6C 6F 63 61 6C 68 6F 73 74 0D 0A              # ost: localhost..
```

A comment indicating packet number and size precedes each packet dump. Note that the commands are not applicable in raw mode and have no effect.

12 Snort++ vs Snort

Snort++ differs from Snort in the following ways:

- command line and conf file syntax made more uniform
- removed unused and deprecated features
- remove as many barriers to successful run as possible (e.g.: no upper bounds on memcaps)
- assume the simplest mode of operation (e.g.: never assume input from or output to some hardcoded filename)
- all Snort config options are grouped into Snort++ modules

12.1 Build Options

- configure --with-lib{pcap,pcre}-* → --with-{pcap,pcre}-*
- control socket, cs_dir, and users were deleted
- POLICY_BY_ID_ONLY code was deleted
- hardened --enable-inline-init-failopen / INLINE_FAILOPEN

12.2 Command Line

- --pause loads config and waits for resume before processing packets
- --require-rule-sid is hardened
- --shell enables interactive Lua shell
- -T is assumed if no input given
- added --help-config prefix to dump all matching settings
- added --script-path
- added -K text; -K text/pcap is old dump/log mode
- added -z <#> and --max-packet-threads <#>
- delete --enable-mpls-multicast, --enable-mpls-overlapping-ip, --max-mpls-labelchain-len, --mpls-payload-type
- deleted --pid-path and --no-interface-pidfile
- deleting command line options which will be available with --lua or some such including: -I, -h, -F, -p, --disable-inline-init-failopen
- hardened -n < 0
- removed --search-method
- replaced "unknown args are bpf" with --bpf
- replaced --dynamic-*-lib[-dir] with --plugin-path (with : separators)
- removed -b, -N, -Z and, --perfmon-file options

12.3 Conf File

- Snort++ has a default unicode.map
- Snort++ will not enforce an upper bound on memcaps and the like within 64 bits
- Snort++ will supply a default *_global config if not specified (Snort would fatal; e.g. http_inspect_server w/o http_inspect_global)
- address list syntax changes: [[and]] must be [[and]] to avoid Lua string parsing errors (unless in quoted string)
- because the Lua conf is live code, we lose file:line locations in app error messages (syntax errors from Lua have file:line)
- changed search-method names for consistency
- delete config include_vlan_in_alerts (not used in code)
- delete config so_rule_memcap (not used in code)
- deleted --disable-attribute-table-reload-thread

- deleted config decode_*_{alerts,drops} (use rules only)
- deleted config dump-dynamic-rules-path
- deleted config ipv6_frag (not actually used)
- deleted config threshold and ips rule threshold (→ event_filter)
- eliminated ac-split; must use ac-full-q split-any-any
- frag3 → defrag, arpspoof → arp_spoof, sfportscan → port_scan, perfmonitor → perf_monitor, bo → back_orifice
- limits like "1234K" are now "limit = 1234, units = *K*"
- lua field names are (lower) case sensitive; snort.conf largely wasn't
- module filenames are not configurable: always <log-dir>/<module-name><suffix> (suffix is determined by module)
- no positional parameters; all name = value
- perf_monitor configuration was simplified
- portscan.detect_ack_scans deleted (exact same as include_midstream)
- removed various run modes - now just one
- frag3 default policy is Linux not bsd
- lowmem* search methods are now in snort_examples
- deleted unused http_inspect stateful mode
- deleted stateless inspection from ftp and telnet
- deleted http and ftp alert options (now strictly rule based)
- preprocessor disabled settings deleted since no longer relevant
- sessions are always created; snort config stateful checks eliminated
- stream5_tcp: prune_log_max deleted; to be replaced with histogram
- stream5_tcp: max_active_responses, min_response_seconds moved to active.max_responses, min_interval

12.4 Rules

- all rules must have a sid
- deleted activate / dynamic rules
- deleted metadata engine shared
- deleted metadata: rule-flushing (with PDU flushing rule flushing can cause missed attacks, the opposite of its intent)
- deleted unused rule_state.action
- fastpattern_offset, fast_pattern_length
- no ; separated content suboptions
- offset, depth, distance, and within must use a space separator not colon (e.g. offset:5; becomes offset 5;)
- rule option sequence: <stub> soid <hidden>
- sid == 0 not allowed
- soid is now a non-metadata option

- content suboptions http_* are now full options and should be place before content
- the following pcre options have been deleted: use sticky buffers instead B, U, P, H, M, C, I, D, K, S, Y
- deleted uricontent ips rule option. uricontent:"foo" -→ http_uri; content:"foo"
- deleted urilen raw and norm; must use http_raw_uri and http_uri instead
- deleted unused http_encode option
- urilen replaced with generic bufferlen which applies to current sticky buffer
- added optional selector to http_header, e.g. http_header:User-Agent;
- multiline rules w/o \n
- #begin ... #end comments

12.5 Output

- alert_fast includes packet data by default
- all text mode outputs default to stdout
- changed default logging mode to -K none
- deleted layer2resets and flexresp2_*
- deleted log_ascii
- general output guideline: don't print zero counts
- Snort++ queues decoder and inspector events to the main event queue before ips policy is selected; since some events may not be enabled, the queue needs to be sized larger than with Snort which used an intermediate queue for decoder events.
- deleted the intermediate http and ftp_telnet event queues
- alert_unified2 and log_unified2 have been deleted

12.6 HTTP Profiles

This section describes the changes to the Http Inspect config option "profile".

Snort 2.X allows users to select pre-defined HTTP server profiles using the config option "profile". The user can choose one of five predefined profiles. When defined, this option will set defaults for other config options within Http Inspect.

With Snort++, the user has the flexibility of defining and fine tuning custom profiles along with the five predefined profiles.

Snort 2.X conf

```
preprocessor http_inspect_server: server default \
    profile apache ports { 80 3128 } max_headers 200
```

Snort 3.0 conf

```
http_inspect = { profile = http_profile_apache }
http_inspect.profile.max_headers = 200

binder =
{
    {
        when = { proto = 'tcp', ports = '80 3128', },
        use = { type = 'http_inspect' },
    },
}
```

Note
The "profile" option now that points to a table "http_profile_apache" which is defined in "snort_defaults.lua" (as follows).

```
http_profile_apache =
{
    profile_type = 'apache',
    server_flow_depth = 300,
    client_flow_depth = 300,
    post_depth = -1,
    chunk_length = 500000,
    ascii = true,
    multi_slash = true,
    directory = true,
    webroot = true,
    utf_8 = true,
    apache_whitespace = true,
    non_strict = true,
    normalize_utf = true,
    normalize_javascript = false,
    max_header_length = 0,
    max_headers = 0,
    max_spaces = 200,
    max_javascript_whitespaces = 200,
    whitespace_chars ='0x9 0xb 0xc 0xd'
}
```

Note
The config option "max_headers" is set to 0 in the profile, but overwritten by "http_inspect.profile.max_headers = 200".

Conversion

Snort2lua can convert the existing snort.conf with the "profile" option to Snort3.0 compatible "profile". Please refer to the Snort2Lua post for more details.

Examples

```
"profile all" ==> "profile = http_profile_default"
"profile apache" ==> "profile = http_profile_apache"
"profile iis" ==> "profile = http_profile_iis"
"profile iis_40" ==> "profile = http_profile_iis_40"
"profile iis_50" ==> "profile = http_profile_iis_50"
```

Defining custom profiles

The complete set of Http Inspect config options that a custom profile can configure can be found by running the following command:

```
snort --help-config http_inspect | grep http_inspect.profile
```

The new Http Inspect (new_http_inspect) implementation of config options is still under development.

13 Snort2Lua

One of the major differences between Snort 2.9.X and Snort 3.0 is the configuration. Snort 2.9.X configuration files are written in Snort-specific syntax while Snort 3.0 configuration files are written in Lua. Snort2Lua is a program specifically designed to convert Snort 2.9.X configuration files into Lua files that Snort 3.0 can understand.

Snort2Lua reads your legacy Snort conf file(s) and generates Snort++ Lua and rules files. When running this program, the only mandatory option is to provide Snort2Lua with a Snort configuration file. The default output file file is snort.lua, the default error file will be snort.rej, and the default rule file is the output file (default is snort.lua). When Snort2Lua finishes running, the resulting configuration file can be successfully run as the Snort3.0 configuration file. The sole exception to this rule is when Snort2Lua cannot find an included file. If that occurs, the file will still be included in the output file and you will need to manually adjust or comment the file name. Additionally, if the exit code is not zero, some of the information may not be successfully converted. Check the error file for all of the conversion problems.

Those errors can occur for a multitude of reasons and are not necessarily bad. For instance, Snort2Lua will only convert preprocessors that are currently supported. Therefore, any unsupported preprocessors or configuration options including DCERP, SIP, and SMTP, will cause an error in Snort2Lua since Snort3.0 does not support those preprocessors. Additionally, any rule options associated with those preprocessors are also not supported. Finally, Snort2Lua expects a valid Snort configuration. Therefore, if the configuration is invalid or has questionable syntax, Snort2Lua may fail to parse the configuration file or create an invalid Snort3.0 configuration file.

There are a also few peculiarities of Snort2Lua that may be confusing to a first time user. Specifically, aside from an initial configuration file (which is specified from the command line or as the file in 'config binding'), every file that is included into Snort3.0 must be either a Lua file or a rule file; the file cannot contain both rules and Lua syntax. Therefore, when parsing a file specified with the 'include' command, Snort2Lua will output both a Lua file and a rule file. Additionally, any line that is a comment in a configuration file will be added in to a comments section at the bottom of the main configuration file. Finally, rules that contain unsupported options will be converted to the best of Snort2Lua's capability and then printed as a comment in the rule file.

13.1 Snort2Lua Command Line

By default, Snort2Lua will attempt to parse every 'include' file and every 'binding' file. There is an option to change this functionality.

When specifying a rule file with one of the command line options, Snort2Lua will output all of the converted rules to that specified rule file. This is especially useful when you are only interesting in converting rules since there is no Lua syntax in rule files. There is also an option that tells Snort2Lua to output every rule for a given configuration into a single rule file. Similarly, there is an option pull all of the Lua syntax from every 'include' file into the output file.

There are currently three output modes: default, quiet, and differences. As expected, quiet mode produces a Snort++ configuration. All errors (aside from Fatal Snort2Lua errors), differences, and comments will omitted from the final output file. Default mode will print everything. That mean you will be able to see exactly what changes have occurred between Snort and Snort++ in addition to the new syntax, the original file's comments, and all errors that have occurred. Finally, differences mode will not actually output a valid Snort3.0 configuration. Instead, you can see the exact options from the input configuration that have changed.

13.1.1 Usage: snort2lua [OPTIONS]... -c <snort_conf> ...

Converts the Snort configuration file specified by the -c or --conf-file options into a Snort++ configuration file

Options:

- **-?** show usage
- **-h** this overview of snort2lua
- **-a** default option. print all data
- **-c <snort_conf>** The Snort <snort_conf> file to convert
- **-d** print the differences, and only the differences, between the Snort and Snort++ configurations to the <out_file>
- **-e <error_file>** output all errors to <error_file>
- **-i** if <snort_conf> file contains any <include_file> or <policy_file> (i.e. *include path/to/conf/other_conf*), do NOT parse those files

- **-m** add a remark to the end of every converted rule
- **-o <out_file>** output the new Snort++ lua configuration to <out_file>
- **-q** quiet mode. Only output valid confiration information to the <out_file>
- **-r <rule_file>** output any converted rule to <rule_file>
- **-s** when parsing <include_file>, write <include_file>'s rules to <rule_file>. Meaningles if *-i* provided
- **-t** when parsing <include_file>, write <include_file>'s information, excluding rules, to <out_file>. Meaningles if *-i* provided
- **-V** Print the current Snort2Lua version
- **--conf-file** Same as *-c*. A Snort <snort_conf> file which will be converted
- **--dont-parse-includes** Same as *-p*. if <snort_conf> file contains any <include_file> or <policy_file> (i.e. *include path/to/conf/other_conf*), do NOT parse those files
- **--error-file=<error_file>** Same as *-e*. output all errors to <error_file>
- **--help** Same as *-h*. this overview of snort2lua
- **--markup** print help in asciidoc compatible format
- **--output-file=<out_file>** Same as *-o*. output the new Snort++ lua configuration to <out_file>
- **--print-all** Same as *-a*. default option. print all data
- **--print-differences** Same as *-d*. output the differences, and only the differences, between the Snort and Snort++ configurations to the <out_file>
- **--quiet** Same as *-q*. quiet mode. Only output valid confiration information to the <out_file>
- **--remark** same as *-m*. add a remark to the end of every converted rule
- **--rule-file=<rule_file>** Same as *-r*. output any converted rule to <rule_file>
- **--single-conf-file** Same as *-t*. when parsing <include_file>, write <include_file>'s information, excluding rules, to <out_file>
- **--single-rule-file** Same as *-s*. when parsing <include_file>, write <include_file>'s rules to <rule_file>.
- **--version** Same as *-V*. Print the current Snort2Lua version

Required option:

- A Snort configuration file to convert. Set with either *-c* or *--conf-file*

Default values:

- <out_file> = snort.lua
- <rule_file> = <out_file> = snort.lua. Rules are written to the *local_rules* variable in the <out_file>
- <error_file> = snort.rej. This file will not be created in quiet mode.

13.2 Known Problems

- Any Snort 'string' which is dependent on a variable will no longer have that variable in the Lua string.
- Snort2Lua currently does not handle variables well. First, that means variables will not always be parsed correctly. Second, sometimes a variables value will be outoput in the lua file rather than a variable For instance, if Snort2Lua attempted to convert the line *include $RULE_PATH/example.rule*, the output may ouput *include /etc/rules/example.rule* instead.
- When Snort2Lua parses a 'binding' configuration file, the rules and configuration will automatically be combined into the same file. Also, the new files name will automatically become the old file's name with a .lua extension. There is currently no way to specify or change that files name.
- If a rule's action is a custom ruletype, that rule action will be silently converted to the rultype's *type*. No warnings or errors are currently emmitted. Additionally, the custom ruletypes outputs will be silently discarded.
- If the original configuration contains a binding that points to another file and the binding file contains an error, Snort2Lua will output the number of rejects for the binding file in addition to the number of rejects in the main file. The two numbers will eventually be combined into one output.

13.3 Usage

Snort2Lua is included in the Snort 3.0 distribution. The Snort2Lua source code is located in the tools/snort2lua directory. The program is automatically built and installed.

Translating your configuration

To run Snort2Lua, the only requirement is a file containing Snort 2.9.X syntax. Assuming your configuration file is named snort.conf, run the command

```
snort2lua -c snort.conf
```

Snort2Lua will output a file named snort.lua. Assuming your snort.conf file is a valid Snort 2.9.X configuration file, than the resulting snort.lua file will always be a valid Snort 3.0 configuration file; any errors that occur are because Snort 3.0 currently does not support all of the Snort 2.9.X options.

Every keyword from the Snort configuration can be found in the output file. If the option or keyword has changed, then a comment containing both the option or keyword's old name and new name will be present in the output file.

Translating a rule file

Snort2Lua can also accommodate translating individual rule files. Assuming the Snort 2.9.X rule file is named snort.rules and you want the new rule file to be name updated.rules, run the command

```
snort2lua -c snort.rules -r updated.rules
```

Snort2Lua will output a file named updated.rules. That file, updated.rules, will always be a valid Snort 3.0 rule file. Any rule that contains unsupported options will be a comment in the output file.

Understanding the Output

Although Snort2Lua outputs very little to the console, there are several things that occur when Snort2Lua runs. This is a list of Snort2Lua outputs.

The console. Every line that Snort2Lua is unable to translate from the Snort 2.9.X format to the Snort 3.0 format is considered an error. Upon exiting, Snort2Lua will print the number of errors that occurred. Snort2Lua will also print the name of the error file.

The output file. As previously mentioned, Snort2Lua will create a Lua file with valid Snort 3.0 syntax. The default Lua file is named snort.lua. This file is the equivalent of your main Snort 2.9.X configuration file.

The rule file. By default, all rules will be printed to the Lua file. However, if a rule file is specified on the command line, any rules found in the Snort 2.9.X configuration will be written to the rule file instead

The error file. By default, the error file is snort.rej. It will only be created if errors exist. Every error referenced on the command line can be found in this file. There are two reasons an error can occur.

- The Snort 2.9.X configuration file has invalid syntax. If Snort 2.9.X cannot parse the configuration file, neither can Snort2Lua. In the example below, Snort2Lua could not convert the line *config bad_option*. Since that is not valid Snort 2.9.X syntax, this is a syntax error.
- The Snort 2.9.X configuration file contains preprocessors and rule options that are not supported in Snort 3.0. If Snort 2.9.X can parse a line that Snort2Lua cannot parse, than Snort 3.0 does not support something in the line. As Snort 3.0 begins supporting these preprocessors and rule options, Snort2Lua will also begin translating these lines. One example of such an error is dcerpc2.

Additional .lua and .rules files. Every time Snort2Lua parses the include or binding keyword, the program will attempt to parse the file referenced by the keyword. Snort2Lua will then create one or two new files. The new files will have a .lua or .rules extension appended to the original filename.

14 Extending Snort++

14.1 Plugins

Snort++ uses a variety of plugins to accomplish much of its processing objectives, including:

- Codec - to decode and encode packets
- Inspector - like the prior preprocessors, for normalization, etc.
- IpsOption - for detection in Snort++ rules
- IpsAction - for custom actions
- Logger - for handling events
- Mpse - for fast pattern matching
- So - for dynamic rules

Plugins have an associated API defined for each type, all of which share a common *header*, called the BaseApi. A dynamic library makes its plugins available by exporting the snort_plugins symbol, which is a null terminated array of BaseApi pointers.

The BaseApi includes type, name, API version, plugin version, and function pointers for constructing and destructing a Module. The specific API add various other data and functions for their given roles.

14.2 Modules

The Module is pervasive in Snort+.`It is how everything, including plugins, are configured.It al so provides access to builtin rules.And as the glue that binds functionality to Snort+`, the capabilities of a Module are expected to grow to include statistics support, etc.

Module configuration is handled by a list of Parameters. Most parameters can be validated by the framework, which means for example that conversion from string to number is done in exactly one place. Providing the builtin rules allows the documentation to include them automatically and also allows for autogenerating the rules at startup.

If we are defining a new Inspector called, say, gadget, it might be configured in snort.lua like this:

```
gadget =
{
    brain = true,
    claw = 3
}
```

When the gadget table is processed, Snort++ will look for a module called gadget. If that Module has an associated API, it will be used to configure a new instance of the plugin. In this case, a GadgetModule would be instantiated, brain and claw would be set, and the Module instance would be passed to the GadgetInspector constructor.

Module has three key virtual methods:

- **begin()** - called when Snort++ starts processing the associated Lua table. This is a good place to allocate any required data and set defaults.
- **set()** - called to set each parameter after validation.
- **end()** - called when Snort++ finishes processing the associated Lua table. This is where additional integrity checks of related parameters should be done.

The configured Module is passed to the plugin constructor which pulls the configuration data from the Module. For non-trivial configurations, the working paradigm is that Module hands a pointer to the configured data to the plugin instance which takes ownership.

Note that there is at most one instance of a given Module, even if multiple plugin instances are created which use that Module. (Multiple instances require Snort++ binding configuration.)

14.3 Inspectors

There are several types of inspector, which determines which inspectors are executed when:

- IT_BINDER - determines which inspectors apply to given flows
- IT_WIZARD - determines which service inspector to use if none explicitly bound
- IT_PACKET - used to process all packets before session and service processing (e.g. normalize)
- IT_NETWORK - processes packets w/o service (e.g. arp_spoof, back_orifice)
- IT_STREAM - for flow tracking, ip defrag, and tcp reassembly
- IT_SERVICE - for http, ftp, telnet, etc.
- IT_PROBE - process all packets after all the above (e.g. perf_monitor, port_scan)

14.4 Codecs

The Snort3.0 Codecs decipher raw packets. These Codecs are now completely pluggable; almost every Snort3.0 Codec can be built dynamically and replaced with an alternative, customized Codec. The pluggable nature has also made it easier to build new Codecs for protocols without having to touch the Snort3.0 code base.

The first step in creating a Codec is defining its class and protocol. Every Codec must inherit from the Snort3.0 Codec class defined in "framework/codec.h". The following is an example Codec named "example" and has an associated struct that is 14 bytes long.

```
#include <cstdint>
#include <arpa/inet.h>
#include “framework/codec.h”
#include "main/snort_types.h"


#define EX_NAME “example”
#define EX_HELP “example codec help string”
```

```
struct Example
{
    uint8_t dst[6];
    uint8_t src[6];
    uint16_t ethertype;

    static inline uint8_t size()
    { return 14; }
}

class ExCodec : public Codec
{
public:
    ExCodec() : Codec(EX_NAME) { }
    ~ExCodec() { }

    bool decode(const RawData&, CodecData&, DecodeData&) override;
    void get_protocol_ids(std::vector<uint16_t>&) override;
};
```

After defining ExCodec, the next step is adding the Codec's decode functionality. The function below does this by implementing a valid decode function. The first parameter, which is the RawData struct, provides both a pointer to the raw data that has come from a wire and the length of that raw data. The function takes this information and validates that there are enough bytes for this protocol. If the raw data's length is less than 14 bytes, the function returns false and Snort3.0 discards the packet; the packet is neither inspected nor processed. If the length is greater than 14 bytes, the function populates two fields in the CodecData struct, next_prot_id and lyr_len. The lyr_len field tells Snort3.0 the number of bytes that this layer contains. The next_prot_id field provides Snort3.0 the value of the next EtherType or IP protocol number.

```
bool ExCodec::decode(const RawData& raw, CodecData& codec, DecodeData&)
{
   if ( raw.len < Example::size() )
       return false;

    const Example* const ex = reinterpret_cast<const Example*>(raw.data);
    codec.next_prot_id = ntohs(ex->ethertype);
    codec.lyr_len = ex->size();
    return true;
}
```

For instance, assume this decode function receives the following raw data with a validated length of 32 bytes:

```
00 11 22 33 44 55 66 77    88 99 aa bb 08 00 45 00
00 38 00 01 00 00 40 06    5c ac 0a 01 02 03 0a 09
```

The Example struct's EtherType field is the 13 and 14 bytes. Therefore, this function tells Snort that the next protocol has an EtherType of 0x0800. Additionally, since the lyr_len is set to 14, Snort knows that the next protocol begins 14 bytes after the beginning of this protocol. The Codec with EtherType 0x0800, which happens to be the IPv4 Codec, will receive the following data with a validated length of 18 (== 32 – 14):

```
45 00 00 38 00 01 00 00    40 06 5c ac 0a 01 02 03
0a 09
```

How does Snort3.0 know that the IPv4 Codec has an EtherType of 0x0800? The Codec class has a second virtual function named get_protocol_ids(). When implementing the function, a Codec can register for any number of values between 0x0000 - 0xFFFF. Then, if the next_proto_id is set to a value for which this Codec has registered, this Codec's decode function will be called. As

a general note, the protocol ids between [0, 0x00FF] are IP protocol numbers, [0x0100, 0x05FF] are custom types, and [0x0600, 0xFFFF] are EtherTypes.

For example, in the get_protocol_ids function below, the ExCodec registers for the protocols numbers 17, 787, and 2054. 17 happens to be the protocol number for UDP while 2054 is ARP's EtherType. Therefore, this Codec will now attempt to decode UDP and ARP data. Additionally, if any Codec sets the next_protocol_id to 787, ExCodec's decode function will be called. Some custom protocols are already defined in the file "protocols/protocol_ids.h"

```
void ExCodec::get_protocol_ids(std::vector<uint16_t>&v)
{
    v.push_back(0x0011); // == 17  == UDP
    v.push_back(0x1313); // == 787  == custom
    v.push_back(0x0806); // == 2054  == ARP
}
```

To register a Codec for Data Link Type's rather than protocols, the function get_data_link_type() can be similarly implemented.

The final step to creating a pluggable Codec is the snort_plugins array. This array is important because when Snort3.0 loads a dynamic library, the program only find plugins that are inside the snort_plugins array. In other words, if a plugin has not been added to the snort_plugins array, that plugin will not be loaded into Snort3.0.

Although the details will not be covered in this post, the following code snippet is a basic CodecApi that Snort3.0 can load. This snippet can be copied and used with only three minor changes. First, in the function ctor, ExCodec should be replaced with the name of the Codec that is being built. Second, EX_NAME must match the Codec's name or Snort will be unable to load this Codec. Third, EX_HELP should be replaced with the general description of this Codec. Once this code snippet has been added, ExCodec is ready to be compiled and plugged into Snort3.0.

```
static Codec* ctor(Module*)
{ return new ExCodec; }

static void dtor(Codec *cd)
{ delete cd; }

static const CodecApi ex_api =
{
    {
        PT_CODEC,
        EX_NAME,
        EX_HELP,
        CDAPI_PLUGIN_V0,
        0,
        nullptr,
        nullptr,
    },
    nullptr, // pointer to a function called during Snort's startup.
    nullptr, // pointer to a function called during Snort's exit.
    nullptr, // pointer to a function called during thread's startup.
    nullptr, // pointer to a function called during thread's destruction.
    ctor, // pointer to the codec constructor.
    dtor, // pointer to the codec destructor.
};

SO_PUBLIC const BaseApi* snort_plugins[] =
{
    &ex_api.base,
    nullptr
};
```

Two example Codecs are available in the extra directory on git and the extra tarball on the Snort3.0 page. One of those examples is the Token Ring Codec while the other example is the PIM Codec.

As a final note, there are four more virtual functions that a Codec should implement: encode, format, update, and log. If the functions are not implemented Snort will not throw any errors. However, Snort may also be unable to accomplish some of its basic functionality.

- encode is called whenever Snort actively responds and needs to builds a packet, i.e. whenever a rule using an IPS ACTION like react, reject, or rewrite is triggered. This function is used to build the response packet protocol by protocol.
- format is called when Snort is rebuilding a packet. For instance, every time Snort reassembles a TCP stream or IP fragment, format is called. Generally, this function either swaps any source and destination fields in the protocol or does nothing.
- update is similar to format in that it is called when Snort is reassembling a packet. Unlike format, this function only sets length fields.
- log is called when either the log_codecs logger or a custom logger that calls PacketManager::log_protocols is used when running Snort3.0.

14.5 IPS Actions

Action plugins specify a builtin action in the API which is used to determine verdict. (Conversely, builtin actions don't have an associated plugin function.)

14.6 Developers Guide

Run doc/dev_guide.sh to generate /tmp/dev_guide.html, an annotated guide to the source tree.

14.7 Piglet Test Harness

In order to assist with plugin development, an experimental mode called "piglet" mode is provided. With piglet mode, you can call individual methods for a specific plugin. The piglet tests are specified as Lua scripts. Each piglet test script defines a test for a specific plugin.

Here is a minimal example of a piglet test script for the IPv4 Codec plugin:

```
plugin =
{
    type = "piglet",
    name = "codec::ipv4",
    use_defaults = true,
    test = function()
        local daq_header = DAQHeader.new()
        local raw_buffer = RawBuffer.new("some data")
        local codec_data = CodecData.new()
        local decode_data = DecodeData.new()

        return Codec.decode(
            daq_header,
            raw_buffer,
            codec_data,
            decode_data
        )
    end
}
```

To run snort in piglet mode, first build snort with the BUILD_PIGLET option turned on (pass the flag -DBUILD_PIGLET:BOOL=ON in cmake).

Then, run the following command:

```
snort --script-path $test_scripts --piglet
```

(where $test_scripts is the directory containing your piglet tests).

The test runner will generate a check-like output, indicating the the results of each test script.

14.8 Piglet Lua API

This section documents the API that piglet exposes to Lua. Refer to the piglet directory in the source tree for examples of usage.

Note: Because of the differences between the Lua and C++ data model and type system, not all parameters map directly to the parameters of the underlying C\++ member functions. Every effort has been made to keep the mappings consist, but there are still some differences. They are documented below.

14.8.1 Plugin Instances

For each test, piglet instantiates plugin specified in the `name` field of the `plugin` table. The virtual methods of the instance are exposed in a table unique to each plugin type. The name of the table is the CamelCase name of the plugin type.

For example, codec plugins have a virtual method called `decode`. This method is called like this:

```
Codec.decode(...)
```

Codec

- `Codec.get_data_link_type()` → `{ int, int, ... }`
- `Codec.get_protocol_ids()` → `{ int, int, ... }`
- `Codec.decode(DAQHeader, RawBuffer, CodecData, DecodeData)` → `bool`
- `Codec.log(RawBuffer, uint[lyr_len])`
- `Codec.encode(RawBuffer, EncState, Buffer)` → `bool`
- `Codec.update(uint[flags_hi], uint[flags_lo], RawBuffer, uint[lyr_len]` → `int`
- `Codec.format(bool[reverse], RawBuffer, DecodeData)`

Differences:

- In `Codec.update()`, the `(uint64_t) flags` parameter has been split into `flags_hi` and `flags_lo`

Inspector

- `Inspector.configure()`
- `Inspector.tinit()`
- `Inspector.tterm()`
- `Inspector.likes(Packet)`
- `Inspector.eval(Packet)`
- `Inspector.clear(Packet)`

- `Inspector.get_buf_from_key(string[key], Packet, RawBuffer) → bool`
- `Inspector.get_buf_from_id(uint[id], Packet, RawBuffer) → bool`
- `Inspector.get_buf_from_type(uint[type], Packet, RawBuffer) → bool`
- `Inspector.get_splitter(bool[to_server]) → StreamSplitter`

Differences: * In `Inspector.configure()`, the `SnortConfig*` parameter is passed implicitly. * the overloaded `get_buf()` member function has been split into three separate methods.

IpsOption

- `IpsOption.hash() → int`
- `IpsOption.is_relative() → bool`
- `IpsOption.fp_research() → bool`
- `IpsOption.get_cursor_type() → int`
- `IpsOption.eval(Cursor, Packet) → int`
- `IpsOption.action(Packet)`

IpsAction

- `IpsAction.exec(Packet)`

Logger

- `Logger.open()`
- `Logger.close()`
- `Logger.reset()`
- `Logger.alert(Packet, string[message], Event)`
- `Logger.log(Packet, string[message], Event)`

SearchEngine

Currently, SearchEngine does not expose any methods.

SoRule

Currently, SoRule does not expose any methods.

Interface Objects

Many of the plugins take C++ classes and structs as arguments. These objects are exposed to the Lua API as Lua userdata. Exposed objects are instantiated by calling the `new` method from each object's method table.

For example, the DecodeData object can be instantiated and exposed to Lua like this:

```
local decode_data = DecodeData.new(...)
```

Each object also exposes useful methods for getting and setting member variables, and calling the C++ methods contained in the the object. These methods can be accessed using the `:` accessor syntax:

```
decode_data:set({ sp = 80, dp = 3500 })
```

Since this is just syntactic sugar for passing the object as the first parameter of the function `DecodeData.set`, an equivalent form is:

```
decode_data.set(decode_data, { sp = 80, dp = 3500 })
```

or even:

```
DecodeData.set(decode_data, { sp = 80, dp = 3500 })
```

Buffer

- `Buffer.new(string[data]) → Buffer`
- `Buffer.new(uint[length]) → Buffer`
- `Buffer.new(RawBuffer) → Buffer`
- `Buffer:allocate(uint[length]) → bool`
- `Buffer:clear()`

CodecData

- `CodecData.new() → CodecData`
- `CodecData.new(uint[next_prot_id]) → CodecData`
- `CodecData.new(fields) → CodecData`
- `CodecData:get() → fields`
- `CodecData:set(fields)`

`fields` is a table with the following contents:

- `next_prot_id`
- `lyr_len`
- `invalid_bytes`
- `proto_bits`
- `codec_flags`
- `ip_layer_cnt`
- `ip6_extension_count`
- `curr_ip6_extension`
- `ip6_csum_proto`

Cursor

- `Cursor.new() → Cursor`
- `Cursor.new(Packet) → Cursor`
- `Cursor.new(string[data]) → Cursor`
- `Cursor.new(RawBuffer) → Cursor`
- `Cursor:reset()`

- `Cursor:reset(Packet)`
- `Cursor:reset(string[data])`
- `Cursor:reset(RawBuffer)`

DAQHeader

- `DAQHeader.new() → DAQHeader`
- `DAQHeader.new(fields) → DAQHeader`
- `DAQHeader:get() → fields`
- `DAQHeader:set(fields)`

`fields` is a table with the following contents:

- `caplen`
- `pktlen`
- `ingress_index`
- `egress_index`
- `ingress_group`
- `egress_group`
- `flags`
- `opaque`

DecodeData

- `DecodeData.new() → DecodeData`
- `DecodeData.new(fields) → DecodeData`
- `DecodeData:reset()`
- `DecodeData:get() → fields`
- `DecodeData:set(fields)`
- `DecodeData:set_ipv4_hdr(RawBuffer, uint[offset])`

`fields` is a table with the following contents:

- `sp`
- `dp`
- `decode_flags`
- `type`

EncState

- `EncState.new() → EncState`
- `EncState.new(uint[flags_lo]) → EncState`

- `EncState.new(uint[flags_lo], uint[flags_hi]) → EncState`
- `EncState.new(uint[flags_lo], uint[flags_hi], uint[next_proto]) → EncState`
- `EncState.new(uint[flags_lo], uint[flags_hi], uint[next_proto], uint[ttl]) → EncState`
- `EncState.new(uint[flags_lo], uint[flags_hi], uint[next_proto], uint[ttl], uint[dsize]) → EncState`

Event

- `Event.new() → Event`
- `Event.new(fields) → Event`
- `Event:get() → fields`
- `Event:set(fields)`

`fields` is a table with the following contents:

- `event_id`
- `event_reference`
- `sig_info`
  - `generator`
  - `id`
  - `rev`
  - `class_id`
  - `priority`
  - `text_rule`
  - `num_services`

Flow

- `Flow.new() → Flow`
- `Flow:reset()`

Packet

- `Packet.new() → Packet`
- `Packet.new(string[data]) → Packet`
- `Packet.new(uint[size]) → Packet`
- `Packet.new(fields) → Packet`
- `Packet.new(RawBuffer) → Packet`
- `Packet.new(DAQHeader) → Packet`
- `Packet:set_decode_data(DecodeData)`
- `Packet:set_data(uint[offset], uint[length])`
- `Packet:set_flow(Flow)`

- `Packet:get() → fields`
- `Packet:set()`
- `Packet:set(string[data])`
- `Packet:set(uint[size])`
- `Packet:set(fields)`
- `Packet:set(RawBuffer)`
- `Packet:set(DAQHeader)`

`fields` is a table with the following contents:

- `packet_flags`
- `xtradata_mask`
- `proto_bits`
- `application_protocol_ordinal`
- `alt_dsize`
- `num_layers`
- `iplist_id`
- `user_policy_id`
- `ps_proto`

Note: `Packet.new()` and `Packet:set()` accept multiple arguments of the types described above in any order

RawBuffer

- `RawBuffer.new() → RawBuffer`
- `RawBuffer.new(uint[size]) → RawBuffer`
- `RawBuffer.new(string[data]) → RawBuffer`
- `RawBuffer:size() → int`
- `RawBuffer:resize(uint[size])`
- `RawBuffer:write(string[data])`
- `RawBuffer:write(string[data], uint[size])`
- `RawBuffer:read() → string`
- `RawBuffer:read(uint[end]) → string`
- `RawBuffer:read(uint[start], uint[end]) → string`

Note: calling `RawBuffer.new()` with no arguments returns a RawBuffer of size 0

StreamSplitter

- `StreamSplitter:scan(Flow, RawBuffer) → int, int`
- `StreamSplitter:scan(Flow, RawBuffer, uint[len]) → int, int`

- `StreamSplitter:scan(Flow, RawBuffer, uint[len], uint[flags]) → int, int`
- `StreamSplitter:reassemble(Flow, uint[total], uint[offset], RawBuffer) → int, RawBuffer`
- `StreamSplitter:reassemble(Flow, uint[total], uint[offset], RawBuffer, uint[len]) → int, RawBuffer`
- `StreamSplitter:reassemble(Flow, uint[total], uint[offset], RawBuffer, uint[len], uint[flags]) → int, RawBuffer`
- `StreamSplitter:finish(Flow) → bool`

Note: StreamSplitter does not have a `new()` method, it must be created by an inspector via `Inspector.get_splitter()`

15 Coding Style

All new code should try to follow these style guidelines. These are not yet firm so feedback is welcome to get something we can live with.

15.1 General

- Generally try to follow http://google-styleguide.googlecode.com/svn/trunk/cppguide.xml, but there are a few differences.
- Each source directory should have a dev_notes.txt file summarizing the key points for the code in that directory. These are built into the developers guide.

15.2 Naming

- Use camel case for namespaces, classes, and types like WhizBangPdfChecker.
- Use lower case identifiers with underscore separators, e.g. some_function() and my_var.
- Use lower case filenames with underscores.

15.3 Comments

- Write comments sparingly with a mind towards future proofing. Often the comments can be obviated with better code. Clear code is better than a comment.
- Function comment blocks are generally just noise that quickly becomes obsolete. If you absolutely must comment on parameters, put each on a separate line along with the comment. That way changing the signature may prompt a change to the comments too.
- Use FIXIT (not FIXTHIS or TODO or whatever) to mark things left for a day or even just a minute. That way we can find them easily and won't lose track of them.
- Presently using FIXIT-X where X = P | H | M | L, indicating perf, high, med, or low priority. For now, H, M, or L can indicate alpha 1, 2, or 3. Perf changes fall between alpha 1 and 2.
- Put the copyright(s) and license in a comment block at the top of each source file (.h and .cc). Don't bother with trivial scripts and make foo. Some interesting Lua code should get a comment block too. Copy and paste exactly from src/main.h (don't reformat).
- Put author, description, etc. in separate comment(s) following the license. Do not put such comments in the middle of the license foo. Be sure to put the author line ahead of the header guard to exclude them from the developers guide.
- Each header should have a comment immediately after the header guard to give an overview of the file so the user knows what's going on.

15.4 Logging

- Messages intended for the user should not look like debug messages. Eg, the function name should not be included.
- Most debug messages should just be deleted.
- Don't bang your error messages (no !). The user feels bad enough about the problem already w/o you shouting at him.

15.5 Types

- Use logical types to make the code clearer and to help the compiler catch problems. typedef uint16_t Port; bool foo(Port) is way better than int foo(int port).
- Use forward declarations (e.g. struct SnortConfig;) instead of void*.
- Try not to use extern data unless absolutely necessary and then put the extern in an appropriate header.
- Use const liberally. In most cases, const char* s = "foo" should be const char* const s = "foo". The former goes in the initialized data section and the latter in read only data section.
- But use const char s[] = "foo" instead of const char* s = "foo" when possible. The latter form allocates a pointer variable and the data while the former allocates only the data.
- Use static wherever possible to minimize public symbols and eliminate unneeded relocations.
- Declare functions virtual only in the parent class introducing the function (not in a derived class that is overriding the function). This makes it clear which class introduces the function.
- Declare functions as override if they are intended to override a function. This makes it possible to find derived implementations that didn't get updated and therefore won't get called due a change in the parent signature.
- Use bool functions instead of int unless there is truly a need for multiple error returns. The C-style use of zero for success and -1 for error is less readable and often leads to messy code that either ignores the various errors anyway or needlessly and ineffectively tries to do something aobut them.

15.6 Macros (aka defines)

- In many cases, even in C++, use #define name "value" instead of a const char* const name = "value" because it will eliminate a symbol from the binary.
- Use inline functions instead of macros where possible (pretty much all cases except where stringification is necessary). Functions offer better typing, avoid re-expansions, and a debugger can break there.
- All macros except simple const values should be wrapped in () and all args should be wrapped in () too to avoid surprises upon expansion. Example:

```
#define SEQ_LT(a,b)  ((int)((a) - (b)) <  0)
```

- Multiline macros should be blocked (i.e. inside { }) to avoid if-else type surprises.

15.7 Formatting

- Indent 4 space chars . . . no tabs!
- If you need to indent many times, something could be rewritten or restructured to make it clearer. Fewer indents is generally easier to write, easier to read, and overall better code.
- Braces go on the line immediately following a new scope (function signature, if, else, loop, switch, etc.

- Use consistent spacing and line breaks. Always indent 4 spaces from the breaking line. Keep lines less than 100 chars; it greatly helps readability.

```
No:
    calling_a_func_with_a_long_name(arg1,
                                    arg2,
                                    arg3);


Yes:
    calling_a_func_with_a_long_name(
        arg1, arg2, arg3);
```

- Put function signature on one line, except when breaking for the arg list:

```
No:
    inline
    bool foo()
    { // ...

Yes:
    inline bool foo()
    { // ...
```

- Put conditional code on the line following the if so it is easy to break on the conditional block:

```
No:
    if ( test ) foo();

Yes:
    if ( test )
        foo();
```

15.8 Headers

- Don't hesitate to create a new header if it is needed. Don't lump unrelated stuff into an header because it is convenient.
- Write header guards like this (leading underscores are reserved for system stuff). In my_header.h:

```
#ifndef MY_HEADER_H
#define MY_HEADER_H
// ...
#endif
```

- Includes from a different directory should specify parent directory. This makes it clear exactly what is included and avoids the primordial soup that results from using -I this -I that -I the_other_thing ... .

```
// given:
src/foo/foo.cc
src/bar/bar.cc
src/bar/baz.cc


// in baz.cc
#include "bar.h"
```

```
// in foo.cc
#include "bar/bar.h"
```

- Includes within installed headers should specify parent directory.
- Just because it is a #define doesn't mean it goes in a header. Everything should be scoped as tightly as possible. Shared implementation declarations should go in a separate header from the interface. And so on.
- A .cc should include its own .h before any others (including system headers). This ensures that the header stands on its own and can be used by clients without include prerequisites.
- Include required headers, all required headers, and nothing but required headers. Don't just clone a bunch of headers because it is convenient.
- Any file depending of #ifdefs should include config.h as shown below. A .h should include it before any other includes, and a .cc should include it immediately after the include of its own .h.

```
#ifdef HAVE_CONFIG_H
#include "config.h"
#endif
```

- Do not put using statements in headers.

15.9 Warnings

- With g++, use at least these compiler flags:

```
-Wall -Wextra -pedantic -Wformat -Wformat-security
-Wunused-but-set-variable -Wno-deprecated-declarations
```

- With clang, use at least these compiler flags:

```
-Wall -Wextra -pedantic -Wformat -Wformat-security
-Wno-deprecated-declarations
```

- Then Fix All Warnings. None Allowed.

15.10 Other

- Prefer *and* over && and *or* over || for new source files.

15.11 Uncrustify

Currently using uncrustify from at https://github.com/bengardner/uncrustify to reformat legacy code and anything that happens to need a makeover at some point.

The working config is crusty.cfg in the top level directory. It does well but will munge some things. Specially formatted INDENT-OFF comments were added in 2 places to avoid a real mess.

You can use uncrustify something like this:

```
uncrustify -c crusty.cfg --replace file.cc
```

16 Reference

16.1 Terminology

- **basic module**: a module integrated into Snort that does not come from a plugin.
- **binder**: inspector that maps configuration to traffic
- **builtin rules**: codec and inspector rules for anomalies detected internally.
- **codec**: short for coder / decoder. These plugins are used for basic protocol decoding, anomaly detection, and construction of active responses.
- **data module**: an adjunct configuration plugin for use with certain inspectors.
- **dynamic rules**: plugin rules loaded at runtime. See SO rules.
- **fast pattern**: the content in an IPS rule that must be found by the search engine in order for a rule to be evaluated.
- **fast pattern matcher**: see search engine.
- **hex**: a type of protocol magic that the wizard uses to identify binary protocols.
- **inspector**: plugin that processes packets (similar to the legacy Snort preprocessor)
- **IPS**: intrusion prevention system, like Snort.
- **IPS action**: plugin that allows you to perform custom actions when events are generated. Unlike loggers, these are invoked before thresholding and can be used to control external agents or send active responses.
- **IPS option**: this plugin is the building blocks of IPS rules.
- **logger**: a plugin that performs output of events and packets. Events are thresholded before reaching loggers.
- **module**: the user facing portion of a Snort component. Modules chiefly provide configuration parameters, but may also provide commands, builtin rules, profiling statistics, peg counts, etc. Note that not all modules are plugins and not all plugins have modules.
- **peg count**: the number of times a given event or condition occurs.
- **plugin**: one of several types of software components that can be loaded from a dynamic library when Snort starts up. Some plugins are coupled with the main engine in such a way that they must be built statically, but a newer version can be loaded dynamically.
- **search engine**: a plugin that performs multipattern searching of packets and payload to find rules that should be evaluated. There are currently no specific modules, although there are several search engine plugins. Related configuration is done with the basic detection module. Aka fast pattern matcher.
- **SO rule**: a IPS rule plugin that performs custom detection that can't be done by a text rule. These rules typically do not have associated modules. SO comes from shared object, meaning dynamic library.
- **spell**: a type of protocol magic that the wizard uses to identify ASCII protocols.
- **text rule**: a rule loaded from the configuration that has a header and body. The header specifies action, protocol, source and destination IP addresses and ports, and direction. The body specifies detection and non-detection options.
- **wizard**: inspector that applies protocol magic to determine which inspectors should be bound to traffic absent a port specific binding. See hex and spell.

16.2 Usage

For the following examples "$my_path" is assumed to be the path to the Snort++ install directory. Additionally, it is assumed that "$my_path/bin" is in your PATH.

16.2.1 Environment

LUA_PATH is used directly by Lua to load and run required libraries. SNORT_LUA_PATH is used by Snort to load supplemental configuration files.

```
export LUA_PATH=$my_path/include/snort/lua/\?.lua\;\;
export SNORT_LUA_PATH=$my_path/etc/snort
```

16.2.2 Help

Print the help summary:

```
snort --help
```

Get help on a specific module ("stream", for example):

```
snort --help-module stream
```

Get help on the "-A" command line option:

```
snort --help-options A
```

Grep for help on threads:

```
snort --help-config | grep thread
```

Output help on "rule" options in AsciiDoc format:

```
snort --markup --help-options rule
```

Note
Snort++ stops reading command-line options after the "--help-**" and "--list-**" options, so any other options should be placed before them.

16.2.3 Sniffing and Logging

Read a pcap:

```
snort -r /path/to/my.pcap
```

Dump the packets to stdout:

```
snort -r /path/to/my.pcap -L dump
```

Dump packets with application data and layer 2 headers

```
snort -r /path/to/my.pcap -L dump -d -e
```

Note
Command line options must be specified separately. "snort -de" won't work. You can still concatenate options and their arguments, however, so "snort -Ldump" will work.

Dump packets from all pcaps in a directory:

```
snort --pcap-dir /path/to/pcap/dir --pcap-filter '*.pcap' -L dump -d -e
```

Log packets to a directory:

```
snort --pcap-dir /path/to/pcap/dir --pcap-filter '*.pcap' -L dump -l /path/to/log/ ↩
    dir
```

16.2.4 Configuration

Validate a configuration file:

```
snort -c $my_path/etc/snort/snort.lua
```

Validate a configuration file and a separate rules file:

```
snort -c $my_path/etc/snort/snort.lua -R $my_path/etc/snort/sample.rules
```

Read rules from stdin and validate:

```
snort -c $my_path/etc/snort/snort.lua --stdin-rules < $my_path/etc/snort/sample. ↩
    rules
```

Enable warnings for Lua configurations and make warnings fatal:

```
snort -c $my_path/etc/snort/snort.lua --warn-all --pedantic
```

Tell Snort++ where to look for additional Lua scripts:

```
snort --script-path /path/to/script/dir
```

16.2.5 IDS mode

Run Snort++ in IDS mode, reading packets from a pcap:

```
snort -c $my_path/etc/snort/snort.lua -r /path/to/my.pcap
```

Log any generated alerts to the console using the "-A" option:

```
snort -c $my_path/etc/snort/snort.lua -r /path/to/my.pcap -A alert_full
```

Add or modify a configuration from the command line using the "--lua" option:

```
snort -c $my_path/etc/snort/snort.lua -r /path/to/my.pcap -A cmg \
    --lua 'ips = { enable_builtin_rules = true }'
```

Note
The "--lua" option can be specified multiple times.

Run Snort++ in IDS mode on an entire directory of pcaps, processing each input source on a separate thread:

```
snort -c $my_path/etc/snort/snort.lua --pcap-dir /path/to/pcap/dir \
    --pcap-filter '*.pcap' --max-packet-threads 8
```

Run Snort++ on 2 interfaces, eth0 and eth1:

```
snort -c $my_path/etc/snort/snort.lua -i "eth0 eth1" -z 2 -A cmg
```

Run Snort++ inline with the afpacket DAQ:

```
snort -c $my_path/etc/snort/snort.lua --daq afpacket -i "eth0:eth1" \
    -A cmg
```

16.3 Plugins

Load external plugins and use the "ex" alert:

```
snort -c $my_path/etc/snort/snort.lua \
    --plugin-path $my_path/lib/snort_extra \
    -A alert_ex -r /path/to/my.pcap
```

Test the LuaJIT rule option *find* loaded from stdin:

```
snort -c $my_path/etc/snort/snort.lua \
    --script-path $my_path/lib/snort_extra \
    --stdin-rules -A cmg -r /path/to/my.pcap << END
alert tcp any any -> any 80 (
    sid:3; msg:"found"; content:"GET";
    find:"pat='HTTP/1%.%d'" ; )
END
```

16.4 Output Files

To make it simple to configure outputs when you run with multiple packet threads, output files are not explicitly configured. Instead, you can use the options below to format the paths:

```
<logdir>/[<run_prefix>][<id#>][<X>]<name>
```

Log to unified in the current directory:

```
snort -c $my_path/etc/snort/snort.lua -r /path/to/my.pcap -A unified2
```

Log to unified in the current directory with a different prefix:

```
snort -c $my_path/etc/snort/snort.lua -r /path/to/my.pcap -A unified2 \
    --run-prefix take2
```

Log to unified in /tmp:

```
snort -c $my_path/etc/snort/snort.lua -r /path/to/my.pcap -A unified2 -l /tmp
```

Run 4 packet threads and log with thread number prefix (0-3):

```
snort -c $my_path/etc/snort/snort.lua --pcap-dir /path/to/pcap/dir \
    --pcap-filter '*.pcap' -z 4 -A unified2
```

Run 4 packet threads and log in thread number subdirs (0-3):

```
snort -c $my_path/etc/snort/snort.lua --pcap-dir /path/to/pcap/dir \
    --pcap-filter '*.pcap' -z 4 -A unified2 --id-subdir
```

Note
subdirectories are created automatically if required. Log filename is based on module name that writes the file. All text mode outputs default to stdout. These options can be combined.

16.4.1 DAQ Alternatives

Process hext packets from stdin:

```
snort -c $my_path/etc/snort/snort.lua \
    --daq-dir $my_path/lib/snort/daqs --daq hext -i tty << END
$packet 10.1.2.3 48620 -> 10.9.8.7 80
"GET / HTTP/1.1\r\n"
"Host: localhost\r\n"
"\r\n"
END
```

Process raw ethernet from hext file:

```
snort -c $my_path/etc/snort/snort.lua \
    --daq-dir $my_path/lib/snort/daqs --daq hext \
    --daq-var dlt=1 -r <hext-file>
```

Process a directory of plain files (ie non-pcap) with 4 threads with 8K buffers:

```
snort -c $my_path/etc/snort/snort.lua \
    --daq-dir $my_path/lib/snort/daqs --daq file \
    --pcap-dir path/to/files -z 4 -s 8192
```

Bridge two TCP connections on port 8000 and inspect the traffic:

```
snort -c $my_path/etc/snort/snort.lua \
    --daq-dir $my_path/lib/snort/daqs --daq socket
```

16.4.2 Logger Alternatives

Dump TCP stream payload in hext mode:

```
snort -c $my_path/etc/snort/snort.lua -L hext
```

Output timestamp, pkt_num, proto, pkt_gen, dgm_len, dir, src_ap, dst_ap, rule, action for each alert:

```
snort -c $my_path/etc/snort/snort.lua -A csv
```

Output the old test format alerts:

```
snort -c $my_path/etc/snort/snort.lua \
    --lua "alert_csv = { fields = 'pkt_num gid sid rev', separator = '\t' }"
```

16.4.3 Shell

You must build with --enable-shell to make the command line shell available.

Enable shell mode:

```
snort --shell <args>
```

You will see the shell mode command prompt, which looks like this:

```
o")~
```

(The prompt can be changed with the SNORT_PROMPT environment variable.)

You can pause immediately after loading the configuration and again before exiting with:

```
snort --shell --pause <args>
```

In that case you must issue the resume() command to continue. Enter quit() to terminate Snort or detach() to exit the shell. You can list the available commands with help().

To enable local telnet access on port 12345:

```
snort --shell -j 12345 <args>
```

The command line interface is still under development. Suggestions are welcome.

16.4.4 Signals

Note
The following examples assume that Snort++ is currently running and has a process ID of <pid>.

Modify and Reload Configuration:

```
echo 'suppress = { { gid = 1, sid = 2215 } }' >> $my_path/etc/snort/snort.lua
kill -hup <pid>
```

Dump stats to stdout:

```
kill -usr1 <pid>
```

Shutdown normally:

```
kill -term <pid>
```

Exit without flushing packets:

```
kill -quit <pid>
```

List available signals:

```
snort --help-signals
```

Note
The available signals may vary from platform to platform.

16.5 Optional Features

The features listed below must be explicitly enabled so they are built into the Snort binary. For a full list of build features, run ./configure --help.

- **--enable-ppm**: enable building packet and rule performance monitoring and coarse latency enforcement.
- **--enable-shell**: enable building local and remote command line shell support.

These features are built only if the required libraries and headers are present. There is no need to explicitly enable.

- **lzma**: for decompression of SWF and PDF files.
- **openssl**: for SHA and MD5 file signatures and the protected_content rule option.
- *intel-soft-cpm": an optional pattern matcher based on a library from Intel.
- hyperscan for the regex rule option and hyperscan search engine.

If you need to use headers and/or libraries in non-standard locations, you can use these options:

- **--with-pkg-includes**: specify the directory containing the package headers.
- **--with-pkg-libraries**: specify the directory containing the package libraries.

These can be use for pcap, luajit, pcre, dnet, daq, lzma, openssl, intel-soft-cpm, and hyperscan packages. For more information on these libraries see the Getting Started section of the manual.

16.6 Environment Variables

- **HOSTTYPE**: optional string that is output with the version at end of line.
- **LUA_PATH**: you must export as follows so LuaJIT can find required files.

```
LUA_PATH=$install_dir/include/snort/lua/\?.lua\;\;
```

- **SNORT_IGNORE**: the list of symbols Snort should ignore when parsing the Lua conf. Unknown symbols not in SNORT_IGNORE will cause warnings with --warn-unknown or fatals with --warn-unknown --pedantic.
- **SNORT_LUA_PATH**: an optional path where Snort can find supplemental conf files such as classification.lua.
- **SNORT_PROMPT**: the character sequence that is printed at startup, shutdown, and in the shell. The default is the mini-pig: o")~ .
- **SNORT_PLUGIN_PATH**: an optional path where Snort can find supplemental shared libraries. This is only used when Snort is building manuals. Modules in supplemental shared libraries will be added to the manuals.

16.7 Command Line Options

- **--alert-before-pass** process alert, drop, sdrop, or reject before pass; default is pass before alert, drop,...
- **--bpf** <filter options> are standard BPF options, as seen in TCPDump
- **--c2x** output hex for given char (see also --x2c)
- **--create-pidfile** create PID file, even when not in Daemon mode
- **--daq** <type> select packet acquisition module (default is pcap)
- **--daq-dir** <dir> tell snort where to find desired DAQ

- **--daq-list** list packet acquisition modules available in optional dir, default is static modules only
- **--daq-mode** <mode> select the DAQ operating mode
- **--daq-var** <name=value> specify extra DAQ configuration variable
- **--dirty-pig** don't flush packets on shutdown
- **--dump-builtin-rules** [<module prefix>] output stub rules for selected modules
- **--dump-defaults** [<module prefix>] output module defaults in Lua format (optional)
- **--dump-dynamic-rules** output stub rules for all loaded rules libraries
- **--dump-version** output the version, the whole version, and only the version (optional)
- **--enable-inline-test** enable Inline-Test Mode Operation
- **--help** list command line options
- **--help-commands** [<module prefix>] output matching commands (optional)
- **--help-config** [<module prefix>] output matching config options (optional)
- **--help-counts** [<module prefix>] output matching peg counts (optional)
- **--help-module** <module> output description of given module
- **--help-modules** list all available modules with brief help
- **--help-options** <option prefix> output matching command line option quick help (same as -?) (optional)
- **--help-plugins** list all available plugins with brief help
- **--help-signals** dump available control signals
- **--id-subdir** create/use instance subdirectories in logdir instead of instance filename prefix
- **--id-zero** use id prefix / subdirectory even with one packet thread
- **--list-buffers** output available inspection buffers
- **--list-builtin** <module prefix> output matching builtin rules (optional)
- **--list-gids** [<module prefix>] output matching generators (optional)
- **--list-modules** [<module type>] list all known modules of given type (optional)
- **--list-plugins** list all known plugins
- **--logid** <0xid> log Identifier to uniquely id events for multiple snorts (same as -G) (0:65535)
- **--lua** <chunk> extend/override conf with chunk; may be repeated
- **--markup** output help in asciidoc compatible format
- **--max-packet-threads** <count> configure maximum number of packet threads (same as -z) (0:)
- **--nolock-pidfile** do not try to lock Snort PID file
- **--nostamps** don't include timestamps in log file names
- **--pause** wait for resume/quit command before processing packets/terminating
- **--pcap-dir** <dir> a directory to recurse to look for pcaps - read mode is implied
- **--pcap-file** <file> file that contains a list of pcaps to read - read mode is implied
- **--pcap-filter** <filter> filter to apply when getting pcaps from file or directory

- **--pcap-list** <list> a space separated list of pcaps to read - read mode is implied
- **--pcap-loop** <count> read all pcaps <count> times; 0 will read until Snort is terminated (-1:)
- **--pcap-no-filter** reset to use no filter when getting pcaps from file or directory
- **--pcap-reload** if reading multiple pcaps, reload snort config between pcaps
- **--pcap-show** print a line saying what pcap is currently being read
- **--pedantic** warnings are fatal
- **--plugin-path** <path> where to find plugins
- **--process-all-events** process all action groups
- **--rule** <rules> to be added to configuration; may be repeated
- **--rule-to-hex** output so rule header to stdout for text rule on stdin
- **--rule-to-text** output plain so rule header to stdout for text rule on stdin
- **--run-prefix** <pfx> prepend this to each output file
- **--script-path** <path> to a luajit script or directory containing luajit scripts
- **--show-plugins** list module and plugin versions
- **--skip** <n> skip 1st n packets (0:)
- **--snaplen** <snap> set snaplen of packet (same as -s) (68:65535)
- **--stdin-rules** read rules from stdin until EOF or a line starting with END is read
- **--treat-drop-as-alert** converts drop, sdrop, and reject rules into alert rules during startup
- **--treat-drop-as-ignore** use drop, sdrop, and reject rules to ignore session traffic when not inline
- **--version** show version number (same as -V)
- **--warn-all** enable all warnings
- **--warn-conf** warn about configuration issues
- **--warn-daq** warn about DAQ issues, usually related to mode
- **--warn-flowbits** warn about flowbits that are checked but not set and vice-versa
- **--warn-hosts** warn about host table issues
- **--warn-plugins** warn about issues that prevent plugins from loading
- **--warn-rules** warn about duplicate rules and rule parsing issues
- **--warn-scripts** warn about issues discovered while processing Lua scripts
- **--warn-symbols** warn about unknown symbols in your Lua config
- **--warn-vars** warn about variable definition and usage issues
- **--x2c** output ASCII char for given hex (see also --c2x)
- **--x2s** output ASCII string for given byte code (see also --x2c)
- **-?** <option prefix> output matching command line option quick help (same as --help-options) (optional)
- **-A** <mode> set alert mode: none, cmg, or alert_*
- **-B** <mask> obfuscated IP addresses in alerts and packet dumps using CIDR mask

- **-C** print out payloads with character data only (no hex)
- **-D** run Snort in background (daemon) mode
- **-G** <0xid> (same as --logid) (0:65535)
- **-H** make hash tables deterministic
- **-L** <mode> logging mode (none, dump, pcap, or log_*)
- **-M** log messages to syslog (not alerts)
- **-O** obfuscate the logged IP addresses
- **-Q** enable inline mode operation
- **-R** <rules> include this rules file in the default policy
- **-S** <x=v> set config variable x equal to value v
- **-T** test and report on the current Snort configuration
- **-U** use UTC for timestamps
- **-V** (same as --version)
- **-W** lists available interfaces
- **-X** dump the raw packet data starting at the link layer
- **-c** <conf> use this configuration
- **-d** dump the Application Layer
- **-e** display the second layer header info
- **-f** turn off fflush() calls after binary log writes
- **-g** <gname> run snort gid as <gname> group (or gid) after initialization
- **-i** <iface>… list of interfaces
- **-k** <mode> checksum mode; default is all (all|noip|notcp|noudp|noicmp|none)
- **-l** <logdir> log to this directory instead of current directory
- **-m** <umask> set umask = <umask> (0:)
- **-n** <count> stop after count packets (0:)
- **-q** quiet mode - Don't show banner and status report
- **-r** <pcap>… (same as --pcap-list)
- **-s** <snap> (same as --snaplen); default is 1514 (68:65535)
- **-t** <dir> chroots process to <dir> after initialization
- **-u** <uname> run snort as <uname> or <uid> after initialization
- **-v** be verbose
- **-w** dump 802.11 management and control frames
- **-x** same as --pedantic
- **-y** include year in timestamp in the alert and log files
- **-z** <count> maximum number of packet threads (same as --max-packet-threads); 0 gets the number of CPU cores reported by the system; default is 1 (0:)

16.8 Parameters

Parameters are given with this format:

```
type name = default: help { range }
```

The following types are used:

- **addr**: any valid IP4 or IP6 address or CIDR
- **addr_list**: a space separated list of addr values
- **bit_list**: a list of consecutive integer values from 1 to the range maximum
- **bool**: true or false
- **dynamic**: a select type determined by loaded plugins
- **enum**: a string selected from the given range
- **implied**: an IPS rule option that takes no value but means true
- **int**: a whole number in the given range
- **ip4**: an IP4 address or CIDR
- **mac**: an ethernet address with the form 01:02:03:04:05:06
- **multi**: one or more space separated strings from the given range
- **port**: an int in the range 0:65535 indicating a TCP or UDP port number
- **real**: a real number in the given range
- **select**: a string selected from the given range
- **string**: any string with no more than the given length, if any

The parameter name may be adorned in various ways to indicate additional information about the type and use of the parameter:

- For Lua configuration (not IPS rules), if the name ends with [] it is a list item and can be repeated.
- For IPS rules only, names starting with ~ indicate positional parameters. The names of such parameters do not appear in the rule.
- IPS rules may also have a wild card parameter, which is indicated by a *. Only used for metadata that Snort ignores.
- The snort module has command line options starting with a -.

Some additional details to note:

- Table and variable names are case sensitive; use lower case only.
- String values are case sensitive too; use lower case only.
- Numeric ranges may be of the form low:high where low and high are bounds included in the range. If either is omitted, there is no hard bound. E.g. 0: means any x where x >= 0.
- Strings may have a numeric range indicating a length limit; otherwise there is no hard limit.
- bit_list is typically used to store a set of byte, port, or VLAN ID values.

16.9 Configuration

- string **ack.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*
- int **active.attempts** = 0: number of TCP packets sent per response (with varying sequence numbers) { 0:20 }
- string **active.device**: use *ip* for network layer responses or *eth0* etc for link layer
- string **active.dst_mac**: use format *01:23:45:67:89:ab*
- int **active.max_responses** = 0: maximum number of responses { 0: }
- int **active.min_interval** = 255: minimum number of seconds between responses { 1: }
- multi **alert_csv.fields** = timestamp pkt_num proto pkt_gen dgm_len dir src_ap dst_ap rule action: selected fields will be output in given order left to right { action | dir | dgm_len | dst_addr | dst_ap | dst_port | eth_dst | eth_len | eth_src | eth_type | gid | icmp_code | icmp_id | icmp_seq | icmp_type | iface | ip_id | ip_len | msg | pkt_gen | pkt_num | proto | rev | rule | sid | src_addr | src_ap | src_port | tcp_ack | tcp_flags | tcp_len | tcp_seq | tcp_win | timestamp | tos | ttl | udp_len }
- bool **alert_csv.file** = false: output to alert_csv.txt instead of stdout
- int **alert_csv.limit** = 0: set limit (0 is unlimited) { 0: }
- string **alert_csv.separator** = , : separate fields with this character sequence
- enum **alert_csv.units** = B: bytes | KB | MB | GB { B | K | M | G }
- bool **alert_ex.upper** = false: true/false → convert to upper/lower case
- bool **alert_fast.file** = false: output to alert_fast.txt instead of stdout
- int **alert_fast.limit** = 0: set limit (0 is unlimited) { 0: }
- bool **alert_fast.packet** = false: output packet dump with alert
- enum **alert_fast.units** = B: bytes | KB | MB | GB { B | K | M | G }
- bool **alert_full.file** = false: output to alert_full.txt instead of stdout
- int **alert_full.limit** = 0: set limit (0 is unlimited) { 0: }
- enum **alert_full.units** = B: limit is in bytes | KB | MB | GB { B | K | M | G }
- enum **alert_syslog.facility** = auth: part of priority applied to each message { auth | authpriv | daemon | user | local0 | local1 | local2 | local3 | local4 | local5 | local6 | local7 }
- enum **alert_syslog.level** = info: part of priority applied to each message { emerg | alert | crit | err | warning | notice | info | debug }
- multi **alert_syslog.options**: used to open the syslog connection { cons | ndelay | perror | pid }
- bool **alerts.alert_with_interface_name** = false: include interface in alert info (fast, full, or syslog only)
- bool **alerts.default_rule_state** = true: enable or disable ips rules
- int **alerts.detection_filter_memcap** = 1048576: set available memory for filters { 0: }
- int **alerts.event_filter_memcap** = 1048576: set available memory for filters { 0: }
- string **alerts.order** = pass drop alert log: change the order of rule action application
- int **alerts.rate_filter_memcap** = 1048576: set available memory for filters { 0: }
- string **alerts.reference_net**: set the CIDR for homenet (for use with -l or -B, does NOT change $HOME_NET in IDS mode)
- bool **alerts.stateful** = false: don't alert w/o established session (note: rule action still taken)

- string **alerts.tunnel_verdicts**: let DAQ handle non-allow verdicts for GTP|Teredo|6in4|4in6 traffic
- ip4 **arp_spoof.hosts[].ip**: host ip address
- mac **arp_spoof.hosts[].mac**: host mac address
- int **asn1.absolute_offset**: Absolute offset from the beginning of the packet. { 0: }
- implied **asn1.bitstring_overflow**: Detects invalid bitstring encodings that are known to be remotely exploitable.
- implied **asn1.double_overflow**: Detects a double ASCII encoding that is larger than a standard buffer.
- int **asn1.oversize_length**: Compares ASN.1 type lengths with the supplied argument. { 0: }
- implied **asn1.print**: <>max | <max | >min
- int **asn1.relative_offset**: relative offset from the cursor.
- int **attribute_table.max_hosts** = 1024: maximum number of hosts in attribute table { 32:207551 }
- int **attribute_table.max_metadata_services** = 8: maximum number of services in rule metadata { 1:256 }
- int **attribute_table.max_services_per_host** = 8: maximum number of services per host entry in attribute table { 1:65535 }
- int **base64_decode.bytes**: Number of base64 encoded bytes to decode. { 1: }
- int **base64_decode.offset** = 0: Bytes past start of buffer to start decoding. { 0: }
- implied **base64_decode.relative**: Apply offset to cursor instead of start of buffer.
- enum **binder[].use.action** = inspect: what to do with matching traffic { reset | block | allow | inspect }
- string **binder[].use.file**: use configuration in given file
- string **binder[].use.name**: symbol name (defaults to type)
- string **binder[].use.service**: override automatic service identification
- string **binder[].use.type**: select module for binding
- bit_list **binder[].when.ifaces**: list of interface indices { 255 }
- addr_list **binder[].when.nets**: list of networks
- int **binder[].when.policy_id** = 0: unique ID for selection of this config by external logic { 0: }
- bit_list **binder[].when.ports**: list of ports { 65535 }
- enum **binder[].when.proto**: protocol { any | ip | icmp | tcp | udp | user | file }
- enum **binder[].when.role** = any: use the given configuration on one or any end of a session { client | server | any }
- string **binder[].when.service**: override default configuration
- bit_list **binder[].when.vlans**: list of VLAN IDs { 4095 }
- string **bufferlen.~range**: len | min<>max | <max | >min
- int **byte_extract.align** = 0: round the number of converted bytes up to the next 2- or 4-byte boundary { 0:4 }
- implied **byte_extract.big**: big endian
- implied **byte_extract.dce**: dcerpc2 determines endianness
- implied **byte_extract.dec**: convert from decimal string
- implied **byte_extract.hex**: convert from hex string
- implied **byte_extract.little**: little endian

- int **byte_extract.multiplier** = 1: scale extracted value by given amount { 1:65535 }
- implied **byte_extract.oct**: convert from octal string
- implied **byte_extract.relative**: offset from cursor instead of start of buffer
- implied **byte_extract.string**: convert from string
- int **byte_extract.~count**: number of bytes to pick up from the buffer { 1:10 }
- string **byte_extract.~name**: name of the variable that will be used in other rule options
- int **byte_extract.~offset**: number of bytes into the buffer to start processing { -65535:65535 }
- int **byte_jump.align** = 0: round the number of converted bytes up to the next 2- or 4-byte boundary { 0:4 }
- implied **byte_jump.big**: big endian
- implied **byte_jump.dce**: dcerpc2 determines endianness
- implied **byte_jump.dec**: convert from decimal string
- implied **byte_jump.from_beginning**: jump from start of buffer instead of cursor
- implied **byte_jump.hex**: convert from hex string
- implied **byte_jump.little**: little endian
- int **byte_jump.multiplier** = 1: scale extracted value by given amount { 1:65535 }
- implied **byte_jump.oct**: convert from octal string
- int **byte_jump.post_offset** = 0: also skip forward or backwards (positive of negative value) this number of bytes { -65535:65535 }
- implied **byte_jump.relative**: offset from cursor instead of start of buffer
- implied **byte_jump.string**: convert from string
- int **byte_jump.~count**: number of bytes to pick up from the buffer { 1:10 }
- string **byte_jump.~offset**: variable name or number of bytes into the buffer to start processing
- implied **byte_test.big**: big endian
- implied **byte_test.dce**: dcerpc2 determines endianness
- implied **byte_test.dec**: convert from decimal string
- implied **byte_test.hex**: convert from hex string
- implied **byte_test.little**: little endian
- implied **byte_test.oct**: convert from octal string
- implied **byte_test.relative**: offset from cursor instead of start of buffer
- implied **byte_test.string**: convert from string
- string **byte_test.~compare**: variable name or value to test the converted result against
- int **byte_test.~count**: number of bytes to pick up from the buffer { 1:10 }
- string **byte_test.~offset**: variable name or number of bytes into the payload to start processing
- string **byte_test.~operator**: variable name or number of bytes into the buffer to start processing
- string **classifications[].name**: name used with classtype rule option

- int **classifications[].priority** = 1: default priority for class { 0: }
- string **classifications[].text**: description of class
- string **classtype.~**: classification for this rule
- string **content.depth**: var or maximum number of bytes to search from beginning of buffer
- string **content.distance**: var or number of bytes from cursor to start search
- implied **content.fast_pattern**: use this content in the fast pattern matcher instead of the content selected by default
- int **content.fast_pattern_length**: maximum number of characters from this content the fast pattern matcher should use { 1: }
- int **content.fast_pattern_offset** = 0: number of leading characters of this content the fast pattern matcher should exclude { 0: }
- implied **content.nocase**: case insensitive match
- string **content.offset**: var or number of bytes from start of buffer to start search
- string **content.within**: var or maximum number of bytes to search from cursor
- string **content.~data**: data to match
- implied **cvs.invalid-entry**: looks for an invalid Entry string
- bool **daq.decode_data_link** = false: display the second layer header info
- string **daq.dir**: directory where to search for DAQ plugins
- select **daq.mode**: set mode of operation { passive | inline | read-file }
- bool **daq.no_promisc** = false: whether to put DAQ device into promiscuous mode
- int **daq.snaplen** = deflt: set snap length (same as -P) { 0:65535 }
- string **daq.type**: select type of DAQ
- string **daq.vars**: comma separated list of name=value DAQ-specific parameters
- string **data_log.key** = http_uri: name of data buffer to log
- int **detection.asn1** = 256: maximum decode nodes { 1: }
- bool **detection.pcre_enable** = true: disable pcre pattern matching
- int **detection.pcre_match_limit** = 1500: limit pcre backtracking, -1 = max, 0 = off { -1:1000000 }
- int **detection.pcre_match_limit_recursion** = 1500: limit pcre stack consumption, -1 = max, 0 = off { -1:10000 }
- int **detection_filter.count**: hits in interval before allowing the rule to fire { 1: }
- int **detection_filter.seconds**: length of interval to count hits { 1: }
- enum **detection_filter.track**: track hits by source or destination IP address { by_src | by_dst }
- bool **dnp3.check_crc** = false: validate checksums in DNP3 link layer frames
- string **dnp3_func.~**: match dnp3 function code or name
- string **dnp3_ind.~**: match given dnp3 indicator flags
- int **dnp3_obj.group** = 0: match given dnp3 object header group { 0:255 }
- int **dnp3_obj.var** = 0: match given dnp3 object header var { 0:255 }
- int **dpx.max** = 0: maximum payload before alert { 0:65535 }

- port **dpx.port**: port to check
- string **dsize.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*
- bool **esp.decode_esp** = false: enable for inspection of esp traffic that has authentication but not encryption
- int **event_filter[].count** = 0: number of events in interval before tripping; -1 to disable { -1: }
- int **event_filter[].gid** = 1: rule generator ID { 0: }
- string **event_filter[].ip**: restrict filter to these addresses according to track
- int **event_filter[].seconds** = 0: count interval { 0: }
- int **event_filter[].sid** = 1: rule signature ID { 0: }
- enum **event_filter[].track**: filter only matching source or destination addresses { by_src | by_dst }
- enum **event_filter[].type**: 1st count events | every count events | once after count events { limit | threshold | both }
- int **event_queue.log** = 3: maximum events to log { 1: }
- int **event_queue.max_queue** = 8: maximum events to queue { 1: }
- enum **event_queue.order_events** = content_length: criteria for ordering incoming events { priority|content_length }
- bool **event_queue.process_all_events** = false: process just first action group or all action groups
- int **file_id.block_timeout** = 86400: stop blocking after this many seconds { 0: }
- bool **file_id.block_timeout_lookup** = false: block if lookup times out
- bool **file_id.enable_capture** = false: enable file capture
- bool **file_id.enable_signature** = false: enable signature calculation
- bool **file_id.enable_type** = false: enable type ID
- bool **file_id.file_policy[].use.enable_file_capture** = false: true/false → enable/disable file capture
- bool **file_id.file_policy[].use.enable_file_signature** = false: true/false → enable/disable file signature
- bool **file_id.file_policy[].use.enable_file_type** = false: true/false → enable/disable file type identification
- enum **file_id.file_policy[].use.verdict** = unknown: what to do with matching traffic { unknown | log | stop | block | reset }
- int **file_id.file_policy[].when.file_type_id** = 0: unique ID for file type in file magic rule { 0: }
- string **file_id.file_policy[].when.sha256**: SHA 256
- string **file_id.file_rules[].category**: file type category
- int **file_id.file_rules[].id** = 0: file type id { 0: }
- string **file_id.file_rules[].magic[].content**: file magic content
- int **file_id.file_rules[].magic[].offset** = 0: file magic offset { 0: }
- string **file_id.file_rules[].msg**: information about the file type
- int **file_id.file_rules[].rev** = 0: rule revision { 0: }
- string **file_id.file_rules[].type**: file type name
- string **file_id.file_rules[].version**: file type version
- int **file_id.lookup_timeout** = 2: give up on lookup after this many seconds { 0: }
- int **file_id.show_data_depth** = 100: print this many octets { 0: }

- int **file_id.signature_depth** = 10485760: stop signature at this point { 0: }
- bool **file_id.trace_signature** = false: enable runtime dump of signature info
- bool **file_id.trace_stream** = false: enable runtime dump of file data
- bool **file_id.trace_type** = false: enable runtime dump of type info
- int **file_id.type_depth** = 1460: stop type ID at this point { 0: }
- string **flags.~mask_flags**: these flags are don't cares
- string **flags.~test_flags**: these flags are tested
- implied **flow.established**: match only during data transfer phase
- implied **flow.from_client**: same as to_server
- implied **flow.from_server**: same as to_client
- implied **flow.no_frag**: match on raw packets only
- implied **flow.no_stream**: match on raw packets only
- implied **flow.not_established**: match only outside data transfer phase
- implied **flow.only_frag**: match on defragmented packets only
- implied **flow.only_stream**: match on reassembled packets only
- implied **flow.stateless**: match regardless of stream state
- implied **flow.to_client**: match on server responses
- implied **flow.to_server**: match on client requests
- string **flowbits.~arg1**: bits or group
- string **flowbits.~arg2**: group if arg1 is bits
- string **flowbits.~command**: set|reset|isset|etc.
- string **fragbits.~flags**: these flags are tested
- string **fragoffset.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*
- bool **ftp_client.bounce** = false: check for bounces
- addr **ftp_client.bounce_to[].address** = 1.0.0.0/32: allowed ip address in CIDR format
- port **ftp_client.bounce_to[].last_port**: optional allowed range from port to last_port inclusive { 0: }
- port **ftp_client.bounce_to[].port** = 20: allowed port { 1: }
- bool **ftp_client.ignore_telnet_erase_cmds** = false: ignore erase character and erase line commands when normalizing
- int **ftp_client.max_resp_len** = -1: maximum ftp response accepted by client { -1: }
- bool **ftp_client.telnet_cmds** = false: detect telnet escape sequences on ftp control channel
- bool **ftp_server.check_encrypted** = false: check for end of encryption
- string **ftp_server.chk_str_fmt**: check the formatting of the given commands
- string **ftp_server.cmd_validity[].command**: command string
- string **ftp_server.cmd_validity[].format**: format specification
- int **ftp_server.cmd_validity[].length** = 0: specify non-default maximum for command { 0: }

- string **ftp_server.data_chan_cmds**: check the formatting of the given commands
- string **ftp_server.data_xfer_cmds**: check the formatting of the given commands
- int **ftp_server.def_max_param_len** = 100: default maximum length of commands handled by server; 0 is unlimited { 1: }
- string **ftp_server.directory_cmds[].dir_cmd**: directory command
- int **ftp_server.directory_cmds[].rsp_code** = 200: expected successful response code for command { 200: }
- string **ftp_server.encr_cmds**: check the formatting of the given commands
- bool **ftp_server.encrypted_traffic** = false: check for encrypted telnet and ftp
- string **ftp_server.file_get_cmds**: check the formatting of the given commands
- string **ftp_server.file_put_cmds**: check the formatting of the given commands
- string **ftp_server.ftp_cmds**: specify additional commands supported by server beyond RFC 959
- bool **ftp_server.ignore_data_chan** = false: do not inspect ftp data channels
- bool **ftp_server.ignore_telnet_erase_cmds** = false: ignore erase character and erase line commands when normalizing
- string **ftp_server.login_cmds**: check the formatting of the given commands
- bool **ftp_server.print_cmds** = false: print command configurations on start up
- bool **ftp_server.telnet_cmds** = false: detect telnet escape sequences of ftp control channel
- int **gid.~**: generator id { 1: }
- string **gtp_info.~**: info element to match
- int **gtp_inspect[].infos[].length** = 0: information element type code { 0:255 }
- string **gtp_inspect[].infos[].name**: information element name
- int **gtp_inspect[].infos[].type** = 0: information element type code { 0:255 }
- string **gtp_inspect[].messages[].name**: message name
- int **gtp_inspect[].messages[].type** = 0: message type code { 0:255 }
- int **gtp_inspect[].version** = 2: gtp version { 0:2 }
- string **gtp_type.~**: list of types to match
- int **gtp_version.~**: version to match { 0:2 }
- enum **hosts[].frag_policy**: defragmentation policy { first | linux | bsd | bsd_right | last | windows | solaris }
- addr **hosts[].ip** = 0.0.0.0/32: hosts address / cidr
- string **hosts[].services[].name**: service identifier
- port **hosts[].services[].port**: port number
- enum **hosts[].services[].proto** = tcp: ip protocol { tcp | udp }
- enum **hosts[].tcp_policy**: tcp reassembly policy { first | last | linux | old_linux | bsd | macos | solaris | irix | hpux11 | hpux10 | windows | win_2003 | vista | proxy }
- int **http_global.compress_depth** = 65535: maximum amount of packet payload to decompress { 1:65535 }
- int **http_global.decode.b64_decode_depth** = 0: single packet decode depth { -1:65535 }
- int **http_global.decode.bitenc_decode_depth** = 0: single packet decode depth { -1:65535 }

- int **http_global.decode.max_mime_mem** = 838860: single packet decode depth { 3276: }
- int **http_global.decode.qp_decode_depth** = 0: single packet decode depth { -1:65535 }
- int **http_global.decode.uu_decode_depth** = 0: single packet decode depth { -1:65535 }
- int **http_global.decompress_depth** = 65535: maximum amount of decompressed data to process { 1:65535 }
- bool **http_global.detect_anomalous_servers** = false: inspect non-configured ports for HTTP - bad idea
- int **http_global.max_gzip_mem** = 838860: total memory used for decompression across all active sessions { 3276: }
- int **http_global.memcap** = 150994944: limit of memory used for logging extra data { 2304: }
- bool **http_global.proxy_alert** = false: alert on proxy usage for servers without allow_proxy_use
- int **http_global.unicode_map.code_page** = 1252: select code page in map file { 0: }
- string **http_global.unicode_map.map_file**: unicode map file
- string **http_header.~name**: restrict to given header
- bool **http_inspect.allow_proxy_use** = false: don't alert on proxy use for this server
- bool **http_inspect.decompress_pdf** = false: enable decompression of the compressed portions of PDF files
- bool **http_inspect.decompress_swf** = false: enable decompression of SWF (Adobe Flash content)
- bool **http_inspect.enable_cookies** = true: extract cookies
- bool **http_inspect.enable_xff** = false: log True-Client-IP and X-Forwarded-For headers with unified2 alerts as extra data
- bool **http_inspect.extended_ascii_uri** = false: allow extended ASCII codes in the request URI
- bool **http_inspect.extended_response_inspection** = true: extract response headers
- string **http_inspect.http_methods** = GET POST PUT SEARCH MKCOL COPY MOVE LOCK UNLOCK NOTIFY POLL BCOPY BDELETE BMOVE LINK UNLINK OPTIONS HEAD DELETE TRACE TRACK CONNECT SOURCE SUBSCRIBE UNSUBSCRIBE PROPFIND PROPPATCH BPROPFIND BPROPPATCH RPC_CONNECT PROXY_SUCCESS BITS_POST CCM_POST SMS_POST RPC_IN_DATA RPC_OUT_DATA RPC_ECHO_DATA: request methods allowed in addition to GET and POST
- bool **http_inspect.inspect_gzip** = true: enable gzip decompression of compressed bodies
- bool **http_inspect.inspect_uri_only** = false: disable all detection except for uricontent
- bool **http_inspect.log_hostname** = false: enable logging of Hostname with unified2 alerts as extra data
- bool **http_inspect.log_uri** = false: enable logging of URI with unified2 alerts as extra data
- bool **http_inspect.no_pipeline_req** = false: don't inspect pipelined requests after first (still does general detection)
- bit_list **http_inspect.non_rfc_chars** = 0x00 0x01 0x02 0x03 0x04 0x05 0x06 0x07: alert on given non-RFC chars being present in the URI { 255 }
- bool **http_inspect.normalize_cookies** = false: normalize cookies similar to URI
- bool **http_inspect.normalize_headers** = false: normalize headers other than cookie similar to URI
- int **http_inspect.oversize_dir_length** = 500: alert if a URL has a directory longer than this limit { 0: }
- bool **http_inspect.profile.apache_whitespace** = false: don't alert if tab is used in lieu of space characters
- bool **http_inspect.profile.ascii** = false: enable decoding ASCII like %2f to /
- bool **http_inspect.profile.bare_byte** = false: decode non-standard, non-ASCII character encodings
- int **http_inspect.profile.chunk_length** = 500000: alert on chunk lengths greater than specified { 1: }

- int **http_inspect.profile.client_flow_depth** = 0: raw request payload to inspect { -1:1460 }
- bool **http_inspect.profile.directory** = false: normalize . and .. sequences out of URI
- bool **http_inspect.profile.double_decode** = false: iis specific extra decoding
- bool **http_inspect.profile.iis_backslash** = false: normalize directory slashes
- bool **http_inspect.profile.iis_delimiter** = false: allow use of non-standard delimiter
- bool **http_inspect.profile.iis_unicode** = false: enable unicode code point mapping using unicode_map settings
- int **http_inspect.profile.iis_unicode_map.code_page** = 1252: select code page in map file { 0: }
- string **http_inspect.profile.iis_unicode_map.map_file**: unicode map file
- int **http_inspect.profile.max_header_length** = 750: maximum allowed client request header field { 0:65535 }
- int **http_inspect.profile.max_headers** = 100: maximum allowed client request headers { 0:1024 }
- int **http_inspect.profile.max_javascript_whitespaces** = 200: maximum number of consecutive whitespaces { 0: }
- int **http_inspect.profile.max_spaces** = 200: maximum allowed whitespaces when folding { 0:65535 }
- bool **http_inspect.profile.multi_slash** = false: normalize out consecutive slashes in URI
- bool **http_inspect.profile.non_strict** = true: allows HTTP 0.9 processing
- bool **http_inspect.profile.normalize_javascript** = true: normalize javascript between <script> tags
- bool **http_inspect.profile.normalize_utf** = true: normalize response bodies with UTF content-types
- int **http_inspect.profile.post_depth** = 65495: amount of POST data to inspect { -1:65535 }
- enum **http_inspect.profile.profile_type** = default: set defaults appropriate for selected server { default | apache | iis | iis_40 | iis_50 }
- int **http_inspect.profile.server_flow_depth** = 0: response payload to inspect; includes headers with extended_response_inspection { -1:65535 }
- bool **http_inspect.profile.u_encode** = true: decode %uXXXX character sequences
- bool **http_inspect.profile.utf_8** = false: decode UTF-8 unicode sequences in URI
- bool **http_inspect.profile.webroot** = false: alert on directory traversals past the top level (web server root)
- bit_list **http_inspect.profile.whitespace_chars**: allowed white space characters { 255 }
- int **http_inspect.small_chunk_count** = 5: alert if more than this limit of consecutive chunks are below small_chunk_length { 0:255 }
- int **http_inspect.small_chunk_length** = 10: alert if more than small_chunk_count consecutive chunks below this limit { 0:255 }
- bool **http_inspect.tab_uri_delimiter** = false: whether a tab not preceded by a space is considered a delimiter or part of URI
- bool **http_inspect.unlimited_decompress** = true: decompress across multiple packets
- bool **http_inspect.xff_headers** = false: not implemented
- string **icmp_id.~range**: check if icmp id is *id* | *min*<>*max* | <*max* | >*min*
- string **icmp_seq.~range**: check if icmp sequence number is *seq* | *min*<>*max* | <*max* | >*min*
- string **icode.~range**: check if ICMP code is *code* | *min*<>*max* | <*max* | >*min*
- string **id.~range**: check if the IP ID is *id* | *min*<>*max* | <*max* | >*min*

- int **imap.b64_decode_depth** = 1460: base64 decoding depth { -1:65535 }
- int **imap.bitenc_decode_depth** = 1460: Non-Encoded MIME attachment extraction depth { -1:65535 }
- int **imap.qp_decode_depth** = 1460: Quoted Printable decoding depth { -1:65535 }
- int **imap.uu_decode_depth** = 1460: Unix-to-Unix decoding depth { -1:65535 }
- string **ip_proto.~proto**: [!|>|<] name or number
- select **ipopts.~opt**: output format { rr|eol|nop|ts|sec|esec|lsrr|lsrre|ssrr|satid|any }
- bool **ips.enable_builtin_rules** = false: enable events from builtin rules w/o stubs
- int **ips.id** = 0: correlate unified2 events with configuration { 0:65535 }
- string **ips.include**: legacy snort rules and includes
- enum **ips.mode**: set policy mode { tap | inline | inline-test }
- string **ips.rules**: snort rules and includes
- implied **isdataat.relative**: offset from cursor instead of start of buffer
- string **isdataat.~length**: num | !num
- string **itype.~range**: check if icmp type is *type* | *min*<>*max* | <*max* | >*min*
- bool **log_codecs.file** = false: output to log_codecs.txt instead of stdout
- bool **log_codecs.msg** = false: include alert msg
- bool **log_hext.file** = false: output to log_hext.txt instead of stdout
- int **log_hext.limit** = 0: set limit (0 is unlimited) { 0: }
- bool **log_hext.raw** = false: output all full packets if true, else just TCP payload
- enum **log_hext.units** = B: bytes | KB | MB | GB { B | K | M | G }
- int **log_hext.width** = 20: set line width (0 is unlimited) { 0: }
- int **log_pcap.limit** = 0: set limit (0 is unlimited) { 0: }
- enum **log_pcap.units** = B: bytes | KB | MB | GB { B | K | M | G }
- int **md5.length**: number of octets in plain text { 1:65535 }
- string **md5.offset**: var or number of bytes from start of buffer to start search
- implied **md5.relative** = false: offset from cursor instead of start of buffer
- string **md5.~hash**: data to match
- string **metadata.***: additional parameters not used by snort
- string **metadata.service**: service name
- string **modbus_func.~**: function code to match
- int **modbus_unit.~**: modbus unit ID { 0:255 }
- bool **mpls.enable_mpls_multicast** = false: enables support for MPLS multicast
- bool **mpls.enable_mpls_overlapping_ip** = false: enable if private network addresses overlap and must be differentiated by MPLS label(s)
- int **mpls.max_mpls_stack_depth** = -1: set MPLS stack depth { -1: }

- enum **mpls.mpls_payload_type** = ip4: set encapsulated payload type { eth | ip4 | ip6 }
- string **msg.~**: message describing rule
- multi **network.checksum_drop** = none: drop if checksum is bad { all | ip | noip | tcp | notcp | udp | noudp | icmp | noicmp | none }
- multi **network.checksum_eval** = none: checksums to verify { all | ip | noip | tcp | notcp | udp | noudp | icmp | noicmp | none }
- bool **network.decode_drops** = false: enable dropping of packets by the decoder
- int **network.id** = 0: correlate unified2 events with configuration { 0:65535 }
- int **network.layers** = 40: The maximum number of protocols that Snort can correctly decode { 3:255 }
- int **network.max_ip6_extensions** = 0: The number of IP6 options Snort will process for a given IPv6 layer. If this limit is hit, rule 116:456 may fire. 0 = unlimited { 0:255 }
- int **network.max_ip_layers** = 0: The maximum number of IP layers Snort will process for a given packet If this limit is hit, rule 116:293 may fire. 0 = unlimited { 0:255 }
- int **network.min_ttl** = 1: alert / normalize packets with lower ttl / hop limit (you must enable rules and / or normalization also) { 1:255 }
- int **network.new_ttl** = 1: use this value for responses and when normalizing { 1:255 }
- int **new_http_inspect.request_depth** = -1: maximum request message body bytes to examine (-1 no limit) { -1: }
- int **new_http_inspect.response_depth** = -1: maximum response message body bytes to examine (-1 no limit) { -1: }
- bool **new_http_inspect.unzip** = true: decompress gzip and deflate message bodies
- bool **normalizer.icmp4** = false: clear reserved flag
- bool **normalizer.icmp6** = false: clear reserved flag
- bool **normalizer.ip4.base** = true: clear options
- bool **normalizer.ip4.df** = false: clear don't frag flag
- bool **normalizer.ip4.rf** = false: clear reserved flag
- bool **normalizer.ip4.tos** = false: clear tos / differentiated services byte
- bool **normalizer.ip4.trim** = false: truncate excess payload beyond datagram length
- bool **normalizer.ip6** = false: clear reserved flag
- string **normalizer.tcp.allow_codes**: don't clear given option codes
- multi **normalizer.tcp.allow_names**: don't clear given option names { sack | echo | partial_order | conn_count | alt_checksum | md5 }
- bool **normalizer.tcp.base** = true: clear reserved bits and option padding and fix urgent pointer / flags issues
- bool **normalizer.tcp.block** = true: allow packet drops during TCP normalization
- select **normalizer.tcp.ecn** = off: clear ecn for all packets | sessions w/o ecn setup { off | packet | stream }
- bool **normalizer.tcp.ips** = false: ensure consistency in retransmitted data
- bool **normalizer.tcp.opts** = true: clear all options except mss, wscale, timestamp, and any explicitly allowed
- bool **normalizer.tcp.pad** = true: clear any option padding bytes
- bool **normalizer.tcp.req_pay** = true: clear the urgent pointer and the urgent flag if there is no payload
- bool **normalizer.tcp.req_urg** = true: clear the urgent pointer if the urgent flag is not set

- bool **normalizer.tcp.req_urp** = true: clear the urgent flag if the urgent pointer is not set
- bool **normalizer.tcp.rsv** = true: clear the reserved bits in the TCP header
- bool **normalizer.tcp.trim** = false: enable all of the TCP trim options
- bool **normalizer.tcp.trim_mss** = false: trim data to MSS
- bool **normalizer.tcp.trim_rst** = false: remove any data from RST packet
- bool **normalizer.tcp.trim_syn** = false: remove data on SYN
- bool **normalizer.tcp.trim_win** = false: trim data to window
- bool **normalizer.tcp.urp** = true: adjust urgent pointer if beyond segment length
- bool **output.dump_chars_only** = false: turns on character dumps (same as -C)
- bool **output.dump_payload** = false: dumps application layer (same as -d)
- bool **output.dump_payload_verbose** = false: dumps raw packet starting at link layer (same as -X)
- int **output.event_trace.max_data** = 0: maximum amount of packet data to capture { 0:65535 }
- bool **output.log_ipv6_extra_data** = false: log IPv6 source and destination addresses as unified2 extra data records
- string **output.logdir** = .: where to put log files (same as -l)
- bool **output.obfuscate** = false: obfuscate the logged IP addresses (same as -O)
- bool **output.quiet** = false: suppress non-fatal information (still show alerts, same as -q)
- bool **output.show_year** = false: include year in timestamp in the alert and log files (same as -y)
- int **output.tagged_packet_limit** = 256: maximum number of packets tagged for non-packet metrics { 0: }
- bool **output.verbose** = false: be verbose (same as -v)
- bool **packets.address_space_agnostic** = false: determines whether DAQ address space info is used to track fragments and connections
- string **packets.bpf_file**: file with BPF to select traffic for Snort
- bool **packets.enable_inline_init_failopen** = true: whether to pass traffic during later stage of initialization to avoid drops
- int **packets.limit** = 0: maximum number of packets to process before stopping (0 is unlimited) { 0: }
- int **packets.skip** = 0: number of packets to skip before before processing { 0: }
- bool **packets.vlan_agnostic** = false: determines whether VLAN info is used to track fragments and connections
- string **pcre.~re**: Snort regular expression
- bool **perf_monitor.console** = false: output to console
- bool **perf_monitor.events** = false: report on qualified vs non-qualified events
- bool **perf_monitor.file** = false: output base stats to perf_monitor.csv instead of stdout
- bool **perf_monitor.flow** = false: enable traffic statistics
- bool **perf_monitor.flow_file** = false: output traffic statistics to a perf_monitor_flow.csv instead of stdout
- bool **perf_monitor.flow_ip** = false: enable statistics on host pairs
- bool **perf_monitor.flow_ip_file** = false: output host pair statistics to perf_monitor_flow_ip.csv instead of stdout
- int **perf_monitor.flow_ip_memcap** = 52428800: maximum memory for flow tracking { 8200: }

- int **perf_monitor.flow_ports** = 1023: maximum ports to track { 0: }
- bool **perf_monitor.max** = false: calculate theoretical maximum performance
- int **perf_monitor.max_file_size** = 1073741824: files will be rolled over if they exceed this size { 4096: }
- int **perf_monitor.packets** = 10000: minim packets to report { 0: }
- bool **perf_monitor.reset** = true: reset (clear) statistics after each reporting interval
- int **perf_monitor.seconds** = 60: report interval; 0 means report at exit only { 0: }
- string **pkt_num.~range**: check if packet number is in given range
- int **pop.b64_decode_depth** = 1460: base64 decoding depth { -1:65535 }
- int **pop.bitenc_decode_depth** = 1460: Non-Encoded MIME attachment extraction depth { -1:65535 }
- int **pop.qp_decode_depth** = 1460: Quoted Printable decoding depth { -1:65535 }
- int **pop.uu_decode_depth** = 1460: Unix-to-Unix decoding depth { -1:65535 }
- string **port_scan.ignore_scanned**: list of CIDRs with optional ports to ignore if the destination of scan alerts
- string **port_scan.ignore_scanners**: list of CIDRs with optional ports to ignore if the source of scan alerts
- bool **port_scan.include_midstream** = false: list of CIDRs with optional ports
- bool **port_scan.logfile** = false: write scan events to file
- multi **port_scan.protos** = all: choose the protocols to monitor { tcp | udp | icmp | ip | all }
- multi **port_scan.scan_types** = all: choose type of scans to look for { portscan | portsweep | decoy_portscan | distributed_portscan | all }
- enum **port_scan.sense_level** = medium: choose the level of detection { low | medium | high }
- string **port_scan.watch_ip**: list of CIDRs with optional ports to watch
- int **port_scan_global.memcap** = 1048576: maximum tracker memory { 1: }
- int **priority.~**: relative severity level; 1 is highest priority { 1: }
- string **process.chroot**: set chroot directory (same as -t)
- bool **process.daemon** = false: fork as a daemon (same as -D)
- bool **process.dirty_pig** = false: shutdown without internal cleanup
- string **process.set_gid**: set group ID (same as -g)
- string **process.set_uid**: set user ID (same as -u)
- int **process.threads[].cpu** = 0: pin the associated source/thread to this cpu { 0:127 }
- string **process.threads[].source**: set cpu affinity for this source (either pcap or <iface>
- int **process.threads[].thread** = 0: set cpu affinity for the <cur_thread_num> thread that runs { 0: }
- string **process.umask**: set process umask (same as -m)
- bool **process.utc** = false: use UTC instead of local time for timestamps
- int **profiler.memory.count** = 0: print results to given level (0 = all) { 0: }
- bool **profiler.memory.show** = true: show module memory profile stats
- enum **profiler.memory.sort** = total_used: sort by given field { none | allocations | total_used | avg_allocation }

- int **profiler.modules.count** = 0: print results to given level (0 = all) { 0: }
- bool **profiler.modules.show** = true: show module time profile stats
- enum **profiler.modules.sort** = total_time: sort by given field { none | checks | avg_check | total_time }
- int **profiler.rules.count** = 0: print results to given level (0 = all) { 0: }
- bool **profiler.rules.show** = true: show rule time profile stats
- enum **profiler.rules.sort** = total_time: sort by given field { none | checks | avg_check | total_time | matches | no_matches | avg_match | avg_no_match }
- string **rate_filter[].apply_to**: restrict filter to these addresses according to track
- int **rate_filter[].count** = 1: number of events in interval before tripping { 0: }
- int **rate_filter[].gid** = 1: rule generator ID { 0: }
- select **rate_filter[].new_action** = alert: take this action on future hits until timeout { alert | drop | log | pass | | reject | sdrop }
- int **rate_filter[].seconds** = 1: count interval { 0: }
- int **rate_filter[].sid** = 1: rule signature ID { 0: }
- int **rate_filter[].timeout** = 1: count interval { 0: }
- enum **rate_filter[].track** = by_src: filter only matching source or destination addresses { by_src | by_dst | by_rule }
- bool **react.msg** = false: use rule msg in response page instead of default message
- string **react.page**: file containing HTTP response (headers and body)
- string **reference.~id**: reference id
- string **reference.~scheme**: reference scheme
- string **references[].name**: name used with reference rule option
- string **references[].url**: where this reference is defined
- implied **regex.dotall**: matching a . will not exclude newlines
- implied **regex.multiline**: ^ and $ anchors match any newlines in data
- implied **regex.nocase**: case insensitive match
- implied **regex.relative**: start search from end of last match instead of start of buffer
- string **regex.~re**: hyperscan regular expression
- enum **reject.control**: send icmp unreachable(s) { network|host|port|all }
- enum **reject.reset**: send tcp reset to one or both ends { source|dest|both }
- string **rem.~**: comment
- string **replace.~**: byte code to replace with
- string **reputation.blacklist**: blacklist file name with ip lists
- int **reputation.memcap** = 500: maximum total memory allocated { 1:4095 }
- enum **reputation.nested_ip** = inner: ip to use when there is IP encapsulation { inner|outer|all }
- enum **reputation.priority** = whitelist: defines priority when there is a decision conflict during run-time { blacklist|whitelist }
- bool **reputation.scan_local** = false: inspect local address defined in RFC 1918

- enum **reputation.white** = unblack: specify the meaning of whitelist { unblack|trust }
- string **reputation.whitelist**: whitelist file name with ip lists
- int **rev.~**: revision { 1: }
- string **rpc.~app**: application number
- string **rpc.~proc**: procedure number or * for any
- string **rpc.~ver**: version number or * for any
- bool **rule_state.enable** = true: enable or disable rule in all policies
- int **rule_state.gid** = 0: rule generator ID { 0: }
- int **rule_state.sid** = 0: rule signature ID { 0: }
- int **search_engine.bleedover_port_limit** = 1024: maximum ports in rule before demotion to any-any port group { 1: }
- bool **search_engine.bleedover_warnings_enabled** = false: print warning if a rule is demoted to any-any port group
- bool **search_engine.debug** = false: print verbose fast pattern info
- bool **search_engine.debug_print_fast_pattern** = false: print fast pattern info for each rule
- bool **search_engine.debug_print_nocontent_rule_tests** = false: print rule group info during packet evaluation
- bool **search_engine.debug_print_rule_group_build_details** = false: print rule group info during compilation
- bool **search_engine.debug_print_rule_groups_compiled** = false: prints compiled rule group information
- bool **search_engine.debug_print_rule_groups_uncompiled** = false: prints uncompiled rule group information
- bool **search_engine.enable_single_rule_group** = false: put all rules into one group
- bool **search_engine.inspect_stream_inserts** = false: inspect reassembled payload - disabling is good for performance, bad for detection
- int **search_engine.max_pattern_len** = 0: truncate patterns when compiling into state machine (0 means no maximum) { 0: }
- int **search_engine.max_queue_events** = 5: maximum number of matching fast pattern states to queue per packet
- dynamic **search_engine.search_method** = ac_bnfa: set fast pattern algorithm - choose available search engine { ac_banded | ac_bnfa | ac_full | ac_sparse | ac_sparse_bands | ac_std | hyperscan | lowmem }
- bool **search_engine.search_optimize** = false: tweak state machine construction for better performance
- bool **search_engine.split_any_any** = false: evaluate any-any rules separately to save memory
- string **seq.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*
- enum **session.~mode**: output format { printable|binary|all }
- int **sha256.length**: number of octets in plain text { 1:65535 }
- string **sha256.offset**: var or number of bytes from start of buffer to start search
- implied **sha256.relative** = false: offset from cursor instead of start of buffer
- string **sha256.~hash**: data to match
- int **sha512.length**: number of octets in plain text { 1:65535 }
- string **sha512.offset**: var or number of bytes from start of buffer to start search
- implied **sha512.relative** = false: offset from cursor instead of start of buffer
- string **sha512.~hash**: data to match

- int **sid.~**: signature id { 1: }
- bool **sip.ignore_call_channel** = false: enables the support for ignoring audio/video data channel
- int **sip.max_call_id_len** = 256: maximum call id field size { 0:65535 }
- int **sip.max_contact_len** = 256: maximum contact field size { 0:65535 }
- int **sip.max_content_len** = 1024: maximum content length of the message body { 0:65535 }
- int **sip.max_dialogs** = 4: maximum number of dialogs within one stream session { 1:4194303 }
- int **sip.max_from_len** = 256: maximum from field size { 0:65535 }
- int **sip.max_requestName_len** = 20: maximum request name field size { 0:65535 }
- int **sip.max_sessions** = 10000: maximum number of sessions that can be allocated { 1024:4194303 }
- int **sip.max_to_len** = 256: maximum to field size { 0:65535 }
- int **sip.max_uri_len** = 256: maximum request uri field size { 0:65535 }
- int **sip.max_via_len** = 1024: maximum via field size { 0:65535 }
- string **sip.methods** = invite cancel ack bye register options: list of methods to check in sip messages
- string **sip_method.*method**: sip method
- int **sip_stat_code.*code**: stat code { 1:999 }
- string **smtp.alt_max_command_line_len[].command**: command string
- int **smtp.alt_max_command_line_len[].length** = 0: specify non-default maximum for command { 0: }
- string **smtp.auth_cmds**: commands that initiate an authentication exchange
- int **smtp.b64_decode_depth** = 25: depth used to decode the base64 encoded MIME attachments { -1:65535 }
- string **smtp.binary_data_cmds**: commands that initiate sending of data and use a length value after the command
- int **smtp.bitenc_decode_depth** = 25: depth used to extract the non-encoded MIME attachments { -1:65535 }
- string **smtp.data_cmds**: commands that initiate sending of data with an end of data delimiter
- int **smtp.email_hdrs_log_depth** = 1464: depth for logging email headers { 0:20480 }
- bool **smtp.ignore_data** = false: ignore data section of mail
- bool **smtp.ignore_tls_data** = false: ignore TLS-encrypted data when processing rules
- string **smtp.invalid_cmds**: alert if this command is sent from client side
- bool **smtp.log_email_hdrs** = false: log the SMTP email headers extracted from SMTP data
- bool **smtp.log_filename** = false: log the MIME attachment filenames extracted from the Content-Disposition header within the MIME body
- bool **smtp.log_mailfrom** = false: log the sender's email address extracted from the MAIL FROM command
- bool **smtp.log_rcptto** = false: log the recipient's email address extracted from the RCPT TO command
- int **smtp.max_command_line_len** = 0: max Command Line Length { 0:65535 }
- int **smtp.max_header_line_len** = 0: max SMTP DATA header line { 0:65535 }
- int **smtp.max_response_line_len** = 0: max SMTP response line { 0:65535 }
- enum **smtp.normalize** = none: turns on/off normalization { none | cmds | all }

- string **smtp.normalize_cmds**: list of commands to normalize
- int **smtp.qp_decode_depth** = 25: quoted-Printable decoding depth { -1:65535 }
- int **smtp.uu_decode_depth** = 25: unix-to-Unix decoding depth { -1:65535 }
- string **smtp.valid_cmds**: list of valid commands
- enum **smtp.xlink2state** = alert: enable/disable xlink2state alert { disable | alert | drop }
- implied **snort.--alert-before-pass**: process alert, drop, sdrop, or reject before pass; default is pass before alert, drop,. . .
- string **snort.--bpf**: <filter options> are standard BPF options, as seen in TCPDump
- string **snort.--c2x**: output hex for given char (see also --x2c)
- implied **snort.--create-pidfile**: create PID file, even when not in Daemon mode
- string **snort.--daq**: <type> select packet acquisition module (default is pcap)
- string **snort.--daq-dir**: <dir> tell snort where to find desired DAQ
- implied **snort.--daq-list**: list packet acquisition modules available in optional dir, default is static modules only
- string **snort.--daq-mode**: <mode> select the DAQ operating mode
- string **snort.--daq-var**: <name=value> specify extra DAQ configuration variable
- implied **snort.--dirty-pig**: don't flush packets on shutdown
- implied **snort.--dump-builtin-rules**: [<module prefix>] output stub rules for selected modules
- string **snort.--dump-defaults**: [<module prefix>] output module defaults in Lua format { (optional) }
- implied **snort.--dump-dynamic-rules**: output stub rules for all loaded rules libraries
- string **snort.--dump-version**: output the version, the whole version, and only the version { (optional) }
- implied **snort.--enable-inline-test**: enable Inline-Test Mode Operation
- implied **snort.--help**: list command line options
- string **snort.--help-commands**: [<module prefix>] output matching commands { (optional) }
- string **snort.--help-config**: [<module prefix>] output matching config options { (optional) }
- string **snort.--help-counts**: [<module prefix>] output matching peg counts { (optional) }
- string **snort.--help-module**: <module> output description of given module
- implied **snort.--help-modules**: list all available modules with brief help
- string **snort.--help-options**: <option prefix> output matching command line option quick help (same as -?) { (optional) }
- implied **snort.--help-plugins**: list all available plugins with brief help
- implied **snort.--help-signals**: dump available control signals
- implied **snort.--id-subdir**: create/use instance subdirectories in logdir instead of instance filename prefix
- implied **snort.--id-zero**: use id prefix / subdirectory even with one packet thread
- implied **snort.--list-buffers**: output available inspection buffers
- string **snort.--list-builtin**: <module prefix> output matching builtin rules { (optional) }
- string **snort.--list-gids**: [<module prefix>] output matching generators { (optional) }
- string **snort.--list-modules**: [<module type>] list all known modules of given type { (optional) }

- implied **snort.--list-plugins**: list all known plugins
- int **snort.--logid**: <0xid> log Identifier to uniquely id events for multiple snorts (same as -G) { 0:65535 }
- string **snort.--lua**: <chunk> extend/override conf with chunk; may be repeated
- implied **snort.--markup**: output help in asciidoc compatible format
- int **snort.--max-packet-threads** = 1: <count> configure maximum number of packet threads (same as -z) { 0: }
- implied **snort.--nolock-pidfile**: do not try to lock Snort PID file
- implied **snort.--nostamps**: don't include timestamps in log file names
- implied **snort.--pause**: wait for resume/quit command before processing packets/terminating
- string **snort.--pcap-dir**: <dir> a directory to recurse to look for pcaps - read mode is implied
- string **snort.--pcap-file**: <file> file that contains a list of pcaps to read - read mode is implied
- string **snort.--pcap-filter**: <filter> filter to apply when getting pcaps from file or directory
- string **snort.--pcap-list**: <list> a space separated list of pcaps to read - read mode is implied
- int **snort.--pcap-loop**: <count> read all pcaps <count> times; 0 will read until Snort is terminated { -1: }
- implied **snort.--pcap-no-filter**: reset to use no filter when getting pcaps from file or directory
- implied **snort.--pcap-reload**: if reading multiple pcaps, reload snort config between pcaps
- implied **snort.--pcap-show**: print a line saying what pcap is currently being read
- implied **snort.--pedantic**: warnings are fatal
- string **snort.--plugin-path**: <path> where to find plugins
- implied **snort.--process-all-events**: process all action groups
- string **snort.--rule**: <rules> to be added to configuration; may be repeated
- implied **snort.--rule-to-hex**: output so rule header to stdout for text rule on stdin
- implied **snort.--rule-to-text**: output plain so rule header to stdout for text rule on stdin
- string **snort.--run-prefix**: <pfx> prepend this to each output file
- string **snort.--script-path**: <path> to a luajit script or directory containing luajit scripts
- implied **snort.--show-plugins**: list module and plugin versions
- int **snort.--skip**: <n> skip 1st n packets { 0: }
- int **snort.--snaplen** = 1514: <snap> set snaplen of packet (same as -s) { 68:65535 }
- implied **snort.--stdin-rules**: read rules from stdin until EOF or a line starting with END is read
- implied **snort.--treat-drop-as-alert**: converts drop, sdrop, and reject rules into alert rules during startup
- implied **snort.--treat-drop-as-ignore**: use drop, sdrop, and reject rules to ignore session traffic when not inline
- implied **snort.--version**: show version number (same as -V)
- implied **snort.--warn-all**: enable all warnings
- implied **snort.--warn-conf**: warn about configuration issues
- implied **snort.--warn-daq**: warn about DAQ issues, usually related to mode
- implied **snort.--warn-flowbits**: warn about flowbits that are checked but not set and vice-versa

- implied **snort.--warn-hosts**: warn about host table issues
- implied **snort.--warn-plugins**: warn about issues that prevent plugins from loading
- implied **snort.--warn-rules**: warn about duplicate rules and rule parsing issues
- implied **snort.--warn-scripts**: warn about issues discovered while processing Lua scripts
- implied **snort.--warn-symbols**: warn about unknown symbols in your Lua config
- implied **snort.--warn-vars**: warn about variable definition and usage issues
- int **snort.--x2c**: output ASCII char for given hex (see also --c2x)
- string **snort.--x2s**: output ASCII string for given byte code (see also --x2c)
- string **snort.-?**: <option prefix> output matching command line option quick help (same as --help-options) { (optional) }
- string **snort.-A**: <mode> set alert mode: none, cmg, or alert_*
- addr **snort.-B** = 255.255.255.255/32: <mask> obfuscated IP addresses in alerts and packet dumps using CIDR mask
- implied **snort.-C**: print out payloads with character data only (no hex)
- implied **snort.-D**: run Snort in background (daemon) mode
- int **snort.-G**: <0xid> (same as --logid) { 0:65535 }
- implied **snort.-H**: make hash tables deterministic
- string **snort.-L**: <mode> logging mode (none, dump, pcap, or log_*)
- implied **snort.-M**: log messages to syslog (not alerts)
- implied **snort.-O**: obfuscate the logged IP addresses
- implied **snort.-Q**: enable inline mode operation
- string **snort.-R**: <rules> include this rules file in the default policy
- string **snort.-S**: <x=v> set config variable x equal to value v
- implied **snort.-T**: test and report on the current Snort configuration
- implied **snort.-U**: use UTC for timestamps
- implied **snort.-V**: (same as --version)
- implied **snort.-W**: lists available interfaces
- implied **snort.-X**: dump the raw packet data starting at the link layer
- string **snort.-c**: <conf> use this configuration
- implied **snort.-d**: dump the Application Layer
- implied **snort.-e**: display the second layer header info
- implied **snort.-f**: turn off fflush() calls after binary log writes
- string **snort.-g**: <gname> run snort gid as <gname> group (or gid) after initialization
- string **snort.-i**: <iface>... list of interfaces
- enum **snort.-k** = all: <mode> checksum mode; default is all { all|noip|notcp|noudp|noicmp|none }
- string **snort.-l**: <logdir> log to this directory instead of current directory
- int **snort.-m**: <umask> set umask = <umask> { 0: }

- int **snort.-n**: <count> stop after count packets { 0: }
- implied **snort.-q**: quiet mode - Don't show banner and status report
- string **snort.-r**: <pcap>... (same as --pcap-list)
- int **snort.-s** = 1514: <snap> (same as --snaplen); default is 1514 { 68:65535 }
- string **snort.-t**: <dir> chroots process to <dir> after initialization
- string **snort.-u**: <uname> run snort as <uname> or <uid> after initialization
- implied **snort.-v**: be verbose
- implied **snort.-w**: dump 802.11 management and control frames
- implied **snort.-x**: same as --pedantic
- implied **snort.-y**: include year in timestamp in the alert and log files
- int **snort.-z** = 1: <count> maximum number of packet threads (same as --max-packet-threads); 0 gets the number of CPU cores reported by the system; default is 1 { 0: }
- string **so.~func**: name of eval function
- string **soid.~**: SO rule ID has <gid>|<sid> format, like 3|12345
- int **ssh.max_client_bytes** = 19600: number of unanswered bytes before alerting on challenge-response overflow or CRC32 { 0:65535 }
- int **ssh.max_encrypted_packets** = 25: ignore session after this many encrypted packets { 0:65535 }
- int **ssh.max_server_version_len** = 80: limit before alerting on secure CRT server version string overflow { 0:255 }
- int **ssl.max_heartbeat_length** = 0: maximum length of heartbeat record allowed { 0:65535 }
- bool **ssl.trust_servers** = false: disables requirement that application (encrypted) data must be observed on both sides
- implied **ssl_state.!client_hello**: check for records that are not client hello
- implied **ssl_state.!client_keyx**: check for records that are not client keyx
- implied **ssl_state.!server_hello**: check for records that are not server hello
- implied **ssl_state.!server_keyx**: check for records that are not server keyx
- implied **ssl_state.!unknown**: check for records that are not unknown
- implied **ssl_state.client_hello**: check for client hello
- implied **ssl_state.client_keyx**: check for client keyx
- implied **ssl_state.server_hello**: check for server hello
- implied **ssl_state.server_keyx**: check for server keyx
- implied **ssl_state.unknown**: check for unknown record
- implied **ssl_version.!sslv2**: check for records that are not sslv2
- implied **ssl_version.!sslv3**: check for records that are not sslv3
- implied **ssl_version.!tls1.0**: check for records that are not tls1.0
- implied **ssl_version.!tls1.1**: check for records that are not tls1.1
- implied **ssl_version.!tls1.2**: check for records that are not tls1.2
- implied **ssl_version.sslv2**: check for sslv2

- implied **ssl_version.sslv3**: check for sslv3
- implied **ssl_version.tls1.0**: check for tls1.0
- implied **ssl_version.tls1.1**: check for tls1.1
- implied **ssl_version.tls1.2**: check for tls1.2
- int **stream.file_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }
- int **stream.file_cache.max_sessions** = 128: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.file_cache.memcap** = 0: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.file_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }
- int **stream.icmp_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }
- int **stream.icmp_cache.max_sessions** = 32768: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.icmp_cache.memcap** = 1048576: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.icmp_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }
- int **stream.ip_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }
- int **stream.ip_cache.max_sessions** = 16384: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.ip_cache.memcap** = 23920640: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.ip_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }
- int **stream.tcp_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }
- int **stream.tcp_cache.max_sessions** = 131072: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.tcp_cache.memcap** = 268435456: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.tcp_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }
- int **stream.udp_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }
- int **stream.udp_cache.max_sessions** = 65536: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.udp_cache.memcap** = 0: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.udp_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }
- int **stream.user_cache.idle_timeout** = 180: maximum inactive time before retiring session tracker { 1: }
- int **stream.user_cache.max_sessions** = 1024: maximum simultaneous sessions tracked before pruning { 1: }
- int **stream.user_cache.memcap** = 1048576: maximum cache memory before pruning (0 is unlimited) { 0: }
- int **stream.user_cache.pruning_timeout** = 30: minimum inactive time before being eligible for pruning { 1: }
- bool **stream_file.upload** = false: indicate file transfer direction
- int **stream_icmp.session_timeout** = 30: session tracking timeout { 1:86400 }
- int **stream_ip.max_frags** = 8192: maximum number of simultaneous fragments being tracked { 1: }
- int **stream_ip.max_overlaps** = 0: maximum allowed overlaps per datagram; 0 is unlimited { 0: }
- int **stream_ip.min_frag_length** = 0: alert if fragment length is below this limit before or after trimming { 0: }
- int **stream_ip.min_ttl** = 1: discard fragments with ttl below the minimum { 1:255 }
- enum **stream_ip.policy** = linux: fragment reassembly policy { first | linux | bsd | bsd_right | last | windows | solaris }

- int **stream_ip.session_timeout** = 30: session tracking timeout { 1:86400 }
- enum **stream_reassemble.action**: stop or start stream reassembly { disable|enable }
- enum **stream_reassemble.direction**: action applies to the given direction(s) { client|server|both }
- implied **stream_reassemble.fastpath**: optionally whitelist the remainder of the session
- implied **stream_reassemble.noalert**: don't alert when rule matches
- enum **stream_size.~direction**: compare applies to the given direction(s) { either|to_server|to_client|both }
- string **stream_size.~range**: size for comparison
- int **stream_tcp.flush_factor** = 0: flush upon seeing a drop in segment size after given number of non-decreasing segments { 0: }
- int **stream_tcp.footprint** = 0: use zero for production, non-zero for testing at given size { 0: }
- bool **stream_tcp.ignore_any_rules** = false: process tcp content rules w/o ports only if rules with ports are present
- int **stream_tcp.max_pdu** = 16384: maximum reassembled PDU size { 1460:65535 }
- int **stream_tcp.max_window** = 0: maximum allowed tcp window { 0:1073725440 }
- int **stream_tcp.overlap_limit** = 0: maximum number of allowed overlapping segments per session { 0:255 }
- enum **stream_tcp.policy** = bsd: determines operating system characteristics like reassembly { first | last | linux | old_linux | bsd | macos | solaris | irix | hpux11 | hpux10 | windows | win_2003 | vista | proxy }
- int **stream_tcp.queue_limit.max_bytes** = 1048576: don't queue more than given bytes per session and direction { 0: }
- int **stream_tcp.queue_limit.max_segments** = 2621: don't queue more than given segments per session and direction { 0: }
- bool **stream_tcp.reassemble_async** = true: queue data for reassembly before traffic is seen in both directions
- int **stream_tcp.require_3whs** = -1: don't track midstream sessions after given seconds from start up; -1 tracks all { -1:86400 }
- int **stream_tcp.session_timeout** = 30: session tracking timeout { 1:86400 }
- bool **stream_tcp.show_rebuilt_packets** = false: enable cmg like output of reassembled packets
- int **stream_tcp.small_segments.count** = 0: limit number of small segments queued { 0:2048 }
- int **stream_tcp.small_segments.maximum_size** = 0: limit number of small segments queued { 0:2048 }
- bool **stream_udp.ignore_any_rules** = false: process udp content rules w/o ports only if rules with ports are present
- int **stream_udp.session_timeout** = 30: session tracking timeout { 1:86400 }
- int **stream_user.session_timeout** = 30: session tracking timeout { 1:86400 }
- int **suppress[].gid** = 0: rule generator ID { 0: }
- string **suppress[].ip**: restrict suppression to these addresses according to track
- int **suppress[].sid** = 0: rule signature ID { 0: }
- enum **suppress[].track**: suppress only matching source or destination addresses { by_src | by_dst }
- int **tag.bytes**: tag for this many bytes { 1: }
- int **tag.packets**: tag this many packets { 1: }
- int **tag.seconds**: tag for this many seconds { 1: }
- enum **tag.~**: log all packets in session or all packets to or from host { session|host_src|host_dst }

- int **telnet.ayt_attack_thresh** = -1: alert on this number of consecutive telnet AYT commands { -1: }
- bool **telnet.check_encrypted** = false: check for end of encryption
- bool **telnet.encrypted_traffic** = false: check for encrypted telnet and ftp
- bool **telnet.normalize** = false: eliminate escape sequences
- string **tos.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*
- string **ttl.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*
- bool **udp.deep_teredo_inspection** = false: look for Teredo on all UDP ports (default is only 3544)
- bool **udp.enable_gtp** = false: decode GTP encapsulations
- bit_list **udp.gtp_ports** = 2152 3386: set GTP ports { 65535 }
- int **unified2.limit** = 0: set limit (0 is unlimited) { 0: }
- bool **unified2.mpls_event_types** = false: include mpls labels in events
- bool **unified2.nostamp** = true: append file creation time to name (in Unix Epoch format)
- enum **unified2.units** = B: limit multiplier { B | K | M | G }
- bool **unified2.vlan_event_types** = false: include vlan IDs in events
- string **urg.~range**: check if urgent offset is min<>max | <max | >min
- string **window.~range**: check if packet payload size is *size* | *min*<>*max* | <*max* | >*min*
- bool **wizard.hexes[].client_first** = true: which end initiates data transfer
- select **wizard.hexes[].proto** = tcp: protocol to scan { tcp | udp }
- string **wizard.hexes[].service**: name of service
- string **wizard.hexes[].to_client[].hex**: sequence of data with wild chars (?)
- string **wizard.hexes[].to_server[].hex**: sequence of data with wild chars (?)
- bool **wizard.spells[].client_first** = true: which end initiates data transfer
- select **wizard.spells[].proto** = tcp: protocol to scan { tcp | udp }
- string **wizard.spells[].service**: name of service
- string **wizard.spells[].to_client[].spell**: sequence of data with wild cards (*)
- string **wizard.spells[].to_server[].spell**: sequence of data with wild cards (*)

16.10 Counts

- **arp_spoof.packets**: total packets
- **back_orifice.packets**: total packets
- **binder.allows**: allow bindings
- **binder.blocks**: block bindings
- **binder.inspects**: inspect bindings
- **binder.packets**: initial bindings
- **binder.resets**: reset bindings

- **daq.allow**: total allow verdicts
- **daq.analyzed**: total packets analyzed from DAQ
- **daq.blacklist**: total blacklist verdicts
- **daq.block**: total block verdicts
- **daq.dropped**: packets dropped
- **daq.fail open**: packets passed during initialization
- **daq.filtered**: packets filtered out
- **daq.idle**: attempts to acquire from DAQ without available packets
- **daq.ignore**: total ignore verdicts
- **daq.injected**: active responses or replacements
- **daq.internal blacklist**: packets blacklisted internally due to lack of DAQ support
- **daq.internal whitelist**: packets whitelisted internally due to lack of DAQ support
- **daq.outstanding**: packets unprocessed
- **daq.pcaps**: total files and interfaces processed
- **daq.received**: total packets received from DAQ
- **daq.replace**: total replace verdicts
- **daq.skipped**: packets skipped at startup
- **daq.whitelist**: total whitelist verdicts
- **data_log.packets**: total packets
- **detection.alert limit**: events previously triggered on same PDU
- **detection.alerts**: alerts not including IP reputation
- **detection.alt searches**: alt fast pattern searches in packet data
- **detection.analyzed**: packets sent to detection
- **detection.body searches**: fast pattern searches in body buffer
- **detection.cooked searches**: fast pattern searches in cooked packet data
- **detection.event limit**: events filtered
- **detection.file searches**: fast pattern searches in file buffer
- **detection.header searches**: fast pattern searches in header buffer
- **detection.key searches**: fast pattern searches in key buffer
- **detection.log limit**: events queued but not logged
- **detection.logged**: logged packets
- **detection.match limit**: fast pattern matches not processed
- **detection.passed**: passed packets
- **detection.pkt searches**: fast pattern searches in packet data
- **detection.queue limit**: events not queued because queue full

- **detection.raw searches**: fast pattern searches in raw packet data
- **detection.slow searches**: non-fast pattern rule evaluations
- **detection.total alerts**: alerts including IP reputation
- **dnp3.dnp3 application pdus**: total dnp3 application pdus
- **dnp3.dnp3 link layer frames**: total dnp3 link layer frames
- **dnp3.tcp pdus**: total tcp pdus
- **dnp3.total packets**: total packets
- **dnp3.udp packets**: total udp packets
- **dns.packets**: total packets processed
- **dns.requests**: total dns requests
- **dns.responses**: total dns responses
- **dpx.packets**: total packets
- **ftp_data.packets**: total packets
- **ftp_server.packets**: total packets
- **gtp_inspect.events**: requests
- **gtp_inspect.sessions**: total sessions processed
- **gtp_inspect.unknown infos**: unknown information elements
- **gtp_inspect.unknown types**: unknown message types
- **http_global.compressed bytes**: total comparessed bytes processed
- **http_global.decompressed bytes**: total bytes decompressed
- **http_global.double unicode**: double unicode normalizations
- **http_global.gets**: GET requests
- **http_global.gzip packets**: packets with gzip compression
- **http_global.non-ascii**: non-ascii normalizations
- **http_global.packets**: total packets processed
- **http_global.paths with ../**: directory traversal normalizations
- **http_global.paths with ./**: relative directory normalizations
- **http_global.paths with //**: double slash normalizations
- **http_global.post params**: POST parameters extracted
- **http_global.posts**: POST requests
- **http_global.request cookies**: requests with Cookie
- **http_global.request headers**: total requests
- **http_global.response cookies**: responses with Set-Cookie
- **http_global.response headers**: total responses
- **http_global.unicode**: unicode normalizations

- **icmp4.bad checksum**: non-zero icmp checksums
- **icmp6.bad checksum (ip4)**: nonzero ipcm4 checksums
- **icmp6.bad checksum (ip6)**: nonzero ipcm6 checksums
- **imap.b64 attachments**: total base64 attachments decoded
- **imap.b64 decoded bytes**: total base64 decoded bytes
- **imap.non-encoded attachments**: total non-encoded attachments extracted
- **imap.non-encoded bytes**: total non-encoded extracted bytes
- **imap.packets**: total packets processed
- **imap.qp attachments**: total quoted-printable attachments decoded
- **imap.qp decoded bytes**: total quoted-printable decoded bytes
- **imap.sessions**: total imap sessions
- **imap.uu attachments**: total uu attachments decoded
- **imap.uu decoded bytes**: total uu decoded bytes
- **ipv4.bad checksum**: nonzero ip checksums
- **modbus.frames**: total Modbus messages
- **modbus.sessions**: total sessions processed
- **normalizer.icmp4 echo**: icmp4 ping normalizations
- **normalizer.icmp6 echo**: icmp6 echo normalizations
- **normalizer.ip4 df**: don't frag bit normalizations
- **normalizer.ip4 opts**: ip4 options cleared
- **normalizer.ip4 rf**: reserved flag bit clears
- **normalizer.ip4 tos**: type of service normalizations
- **normalizer.ip4 trim**: eth packets trimmed to datagram size
- **normalizer.ip4 ttl**: time-to-live normalizations
- **normalizer.ip6 hops**: ip6 hop limit normalizations
- **normalizer.ip6 options**: ip6 options cleared
- **normalizer.tcp block**: blocked segments
- **normalizer.tcp ecn pkt**: packets with ECN bits cleared
- **normalizer.tcp ecn session**: ECN bits cleared
- **normalizer.tcp ips data**: normalized segments
- **normalizer.tcp nonce**: packets with nonce bit cleared
- **normalizer.tcp options**: packets with options cleared
- **normalizer.tcp paddding**: packets with padding cleared
- **normalizer.tcp req pay**: cleared urgent pointer and urgent flag when there is no payload
- **normalizer.tcp req urg**: cleared urgent pointer when urgent flag is not set

- **normalizer.tcp req urp**: cleared the urgent flag if the urgent pointer is not set
- **normalizer.tcp reserved**: packets with reserved bits cleared
- **normalizer.tcp syn options**: SYN only options cleared from non-SYN packets
- **normalizer.tcp trim mss**: data trimmed to MSS
- **normalizer.tcp trim rst**: RST packets with data trimmed
- **normalizer.tcp trim syn**: tcp segments trimmed on SYN
- **normalizer.tcp trim win**: data trimed to window
- **normalizer.tcp ts ecr**: timestamp cleared on non-ACKs
- **normalizer.tcp ts nop**: timestamp options cleared
- **normalizer.tcp urgent ptr**: packets without data with urgent pointer cleared
- **normalizer.test icmp4 echo**: test icmp4 ping normalizations
- **normalizer.test icmp6 echo**: test icmp6 echo normalizations
- **normalizer.test ip4 df**: test don't frag bit normalizations
- **normalizer.test ip4 opts**: test ip4 options cleared
- **normalizer.test ip4 rf**: test reserved flag bit clears
- **normalizer.test ip4 tos**: test type of service normalizations
- **normalizer.test ip4 trim**: test eth packets trimmed to datagram size
- **normalizer.test ip4 ttl**: test time-to-live normalizations
- **normalizer.test ip6 hops**: test ip6 hop limit normalizations
- **normalizer.test ip6 options**: test ip6 options cleared
- **normalizer.test tcp block**: test blocked segments
- **normalizer.test tcp ecn pkt**: test packets with ECN bits cleared
- **normalizer.test tcp ecn session**: test ECN bits cleared
- **normalizer.test tcp ips data**: test normalized segments
- **normalizer.test tcp nonce**: test packets with nonce bit cleared
- **normalizer.test tcp options**: test packets with options cleared
- **normalizer.test tcp paddding**: test packets with padding cleared
- **normalizer.test tcp req pay**: test cleared urgent pointer and urgent flag when there is no payload
- **normalizer.test tcp req urg**: test cleared urgent pointer when urgent flag is not set
- **normalizer.test tcp req urp**: test cleared the urgent flag if the urgent pointer is not set
- **normalizer.test tcp reserved**: test packets with reserved bits cleared
- **normalizer.test tcp syn options**: test SYN only options cleared from non-SYN packets
- **normalizer.test tcp trim mss**: test data trimmed to MSS
- **normalizer.test tcp trim rst**: test RST packets with data trimmed
- **normalizer.test tcp trim syn**: test tcp segments trimmed on SYN

- **normalizer.test tcp trim win**: test data trimed to window
- **normalizer.test tcp ts ecr**: test timestamp cleared on non-ACKs
- **normalizer.test tcp ts nop**: test timestamp options cleared
- **normalizer.test tcp urgent ptr**: test packets without data with urgent pointer cleared
- **perf_monitor.packets**: total packets
- **pop.b64 attachments**: total base64 attachments decoded
- **pop.b64 decoded bytes**: total base64 decoded bytes
- **pop.non-encoded attachments**: total non-encoded attachments extracted
- **pop.non-encoded bytes**: total non-encoded extracted bytes
- **pop.packets**: total packets processed
- **pop.qp attachments**: total quoted-printable attachments decoded
- **pop.qp decoded bytes**: total quoted-printable decoded bytes
- **pop.sessions**: total pop sessions
- **pop.uu attachments**: total uu attachments decoded
- **pop.uu decoded bytes**: total uu decoded bytes
- **port_scan_global.packets**: total packets
- **reputation.blacklisted**: number of packets blacklisted
- **reputation.memory_allocated**: total memory allocated
- **reputation.monitored**: number of packets monitored
- **reputation.packets**: total packets processed
- **reputation.whitelisted**: number of packets whitelisted
- **rpc_decode.packets**: total packets
- **sip.1xx**: 1xx
- **sip.2xx**: 2xx
- **sip.3xx**: 3xx
- **sip.4xx**: 4xx
- **sip.5xx**: 5xx
- **sip.6xx**: 6xx
- **sip.7xx**: 7xx
- **sip.8xx**: 8xx
- **sip.9xx**: 9xx
- **sip.ack**: ack
- **sip.bye**: bye
- **sip.cancel**: cancel
- **sip.dialogs**: total dialogs

- **sip.events**: events generated
- **sip.ignored channels**: total channels ignored
- **sip.ignored sessions**: total sessions ignored
- **sip.info**: info
- **sip.invite**: invite
- **sip.join**: join
- **sip.message**: message
- **sip.notify**: notify
- **sip.options**: options
- **sip.packets**: total packets
- **sip.prack**: prack
- **sip.refer**: refer
- **sip.register**: register
- **sip.sessions**: total sessions
- **sip.subscribe**: subscribe
- **sip.total requests**: total requests
- **sip.total responses**: total responses
- **sip.update**: update
- **smtp.b64 attachments**: total base64 attachments decoded
- **smtp.b64 decoded bytes**: total base64 decoded bytes
- **smtp.concurrent sessions**: total concurrent smtp sessions
- **smtp.max concurrent sessions**: maximum concurrent smtp sessions
- **smtp.non-encoded attachments**: total non-encoded attachments extracted
- **smtp.non-encoded bytes**: total non-encoded extracted bytes
- **smtp.packets**: total packets processed
- **smtp.qp attachments**: total quoted-printable attachments decoded
- **smtp.qp decoded bytes**: total quoted-printable decoded bytes
- **smtp.sessions**: total smtp sessions
- **smtp.uu attachments**: total uu attachments decoded
- **smtp.uu decoded bytes**: total uu decoded bytes
- **snort.attribute table hosts**: total number of hosts in table
- **snort.attribute table reloads**: number of times hosts table was reloaded
- **snort.conf reloads**: number of times configuration was reloaded
- **snort.local commands**: total local commands processed
- **snort.remote commands**: total remote commands processed

- **snort.signals**: total signals processed
- **ssh.packets**: total packets
- **ssl.alert**: total ssl alert records
- **ssl.bad handshakes**: total bad handshakes
- **ssl.certificate**: total ssl certificates
- **ssl.change cipher**: total change cipher records
- **ssl.client application**: total client application records
- **ssl.client hello**: total client hellos
- **ssl.client key exchange**: total client key exchanges
- **ssl.decoded**: ssl packets decoded
- **ssl.detection disabled**: total detection disabled
- **ssl.finished**: total handshakes finished
- **ssl.handshakes completed**: total completed ssl handshakes
- **ssl.packets**: total packets processed
- **ssl.server application**: total server application records
- **ssl.server done**: total server done
- **ssl.server hello**: total server hellos
- **ssl.server key exchange**: total server key exchanges
- **ssl.sessions ignored**: total sessions ignore
- **ssl.unrecognized records**: total unrecognized records
- **stream.file flows**: total file sessions
- **stream.file prunes**: file sessions pruned
- **stream.icmp flows**: total icmp sessions
- **stream.icmp prunes**: icmp sessions pruned
- **stream.ip flows**: total ip sessions
- **stream.ip prunes**: ip sessions pruned
- **stream.tcp flows**: total tcp sessions
- **stream.tcp prunes**: tcp sessions pruned
- **stream.udp flows**: total udp sessions
- **stream.udp prunes**: udp sessions pruned
- **stream.user flows**: total user sessions
- **stream.user prunes**: user sessions pruned
- **stream_icmp.created**: icmp session trackers created
- **stream_icmp.released**: icmp session trackers released
- **stream_ip.alerts**: alerts generated

- **stream_ip.anomalies**: anomalies detected
- **stream_ip.discards**: fragments discarded
- **stream_ip.drops**: fragments dropped
- **stream_ip.frag timeouts**: datagrams abandoned
- **stream_ip.fragments**: total fragments
- **stream_ip.memory faults**: memory faults
- **stream_ip.nodes deleted**: fragments deleted from tracker
- **stream_ip.nodes inserted**: fragments added to tracker
- **stream_ip.overlaps**: overlapping fragments
- **stream_ip.reassembled**: reassembled datagrams
- **stream_ip.trackers added**: datagram trackers created
- **stream_ip.trackers freed**: datagram trackers released
- **stream_tcp.3way trackers**: tcp session tracking started on ack
- **stream_tcp.client cleanups**: number of times data from server was flushed when session released
- **stream_tcp.data trackers**: tcp session tracking started on data
- **stream_tcp.discards**: tcp packets discarded
- **stream_tcp.events**: events generated
- **stream_tcp.gaps**: missing data between PDUs
- **stream_tcp.ignored**: tcp packets ignored
- **stream_tcp.internal events**: 135:X events generated
- **stream_tcp.max bytes**: number of times the maximum queued byte limit was reached
- **stream_tcp.max segs**: number of times the maximum queued segment limit was reached
- **stream_tcp.overlaps**: overlapping segments queued
- **stream_tcp.rebuilt buffers**: rebuilt PDU sections
- **stream_tcp.rebuilt packets**: total reassembled PDUs
- **stream_tcp.resyns**: SYN received on established session
- **stream_tcp.segs queued**: total segments queued
- **stream_tcp.segs released**: total segments released
- **stream_tcp.segs split**: tcp segments split when reassembling PDUs
- **stream_tcp.segs used**: queued tcp segments applied to reassembled PDUs
- **stream_tcp.server cleanups**: number of times data from client was flushed when session released
- **stream_tcp.sessions**: total sessions
- **stream_tcp.syn trackers**: tcp session tracking started on syn
- **stream_tcp.syn-ack trackers**: tcp session tracking started on syn-ack
- **stream_tcp.timeouts**: sessions timed out

- **stream_tcp.trackers created**: tcp session trackers created
- **stream_tcp.trackers released**: tcp session trackers released
- **stream_tcp.untracked**: tcp packets not tracked
- **stream_udp.created**: udp session trackers created
- **stream_udp.released**: udp session trackers released
- **stream_udp.sessions**: total udp sessions
- **stream_udp.timeouts**: udp session timeouts
- **tcp.bad checksum (ip4)**: nonzero tcp over ip checksums
- **tcp.bad checksum (ip6)**: nonzero tcp over ipv6 checksums
- **telnet.packets**: total packets
- **udp.bad checksum (ip4)**: nonzero udp over ipv4 checksums
- **udp.bad checksum (ip6)**: nonzero udp over ipv6 checksums
- **wizard.tcp hits**: tcp identifications
- **wizard.tcp scans**: tcp payload scans
- **wizard.udp hits**: udp identifications
- **wizard.udp scans**: udp payload scans
- **wizard.user hits**: user identifications
- **wizard.user scans**: user payload scans

16.11 Generators

- **105**: back_orifice
- **106**: rpc_decode
- **112**: arp_spoof
- **116**: arp
- **116**: auth
- **116**: decode
- **116**: eapol
- **116**: erspan2
- **116**: erspan3
- **116**: esp
- **116**: eth
- **116**: fabricpath
- **116**: gre
- **116**: gtp
- **116**: icmp4

- **116**: icmp6
- **116**: igmp
- **116**: ipv4
- **116**: ipv6
- **116**: mpls
- **116**: pgm
- **116**: pppoe
- **116**: tcp
- **116**: token_ring
- **116**: udp
- **116**: vlan
- **116**: wlan
- **119**: http_global
- **120**: http_inspect
- **122**: port_scan
- **123**: stream_ip
- **124**: smtp
- **125**: ftp_server
- **126**: telnet
- **128**: ssh
- **129**: stream_tcp
- **131**: dns
- **136**: reputation
- **137**: ssl
- **140**: sip
- **141**: imap
- **142**: pop
- **143**: gtp_inspect
- **144**: modbus
- **145**: dnp3
- **219**: new_http_inspect
- **256**: dpx

16.12 Builtin Rules

- **105:1** (back_orifice) BO traffic detected
- **105:2** (back_orifice) BO client traffic detected
- **105:3** (back_orifice) BO server traffic detected
- **105:4** (back_orifice) BO Snort buffer attack
- **106:1** (rpc_decode) fragmented RPC records
- **106:2** (rpc_decode) multiple RPC records
- **106:3** (rpc_decode) large RPC record fragment
- **106:4** (rpc_decode) incomplete RPC segment
- **106:5** (rpc_decode) zero-length RPC fragment
- **112:1** (arp_spoof) unicast ARP request
- **112:2** (arp_spoof) ethernet/ARP mismatch request for source
- **112:3** (arp_spoof) ethernet/ARP mismatch request for destination
- **112:4** (arp_spoof) attempted ARP cache overwrite attack
- **116:1** (ipv4) Not IPv4 datagram
- **116:2** (ipv4) hlen < minimum
- **116:3** (ipv4) IP dgm len < IP Hdr len
- **116:4** (ipv4) Ipv4 Options found with bad lengths
- **116:5** (ipv4) Truncated Ipv4 Options
- **116:6** (ipv4) IP dgm len > captured len
- **116:45** (tcp) TCP packet len is smaller than 20 bytes
- **116:46** (tcp) TCP data offset is less than 5
- **116:47** (tcp) TCP header length exceeds packet length
- **116:54** (tcp) TCP options found with bad lengths
- **116:55** (tcp) truncated TCP options
- **116:56** (tcp) T/TCP detected
- **116:57** (tcp) obsolete TCP options found
- **116:58** (tcp) experimental TCP options found
- **116:59** (tcp) TCP window scale option found with length > 14
- **116:95** (udp) truncated UDP header
- **116:96** (udp) invalid UDP header, length field < 8
- **116:97** (udp) short UDP packet, length field > payload length
- **116:98** (udp) long UDP packet, length field < payload length
- **116:105** (icmp4) ICMP header truncated
- **116:106** (icmp4) ICMP timestamp header truncated

- **116:107** (icmp4) ICMP address header truncated
- **116:109** (arp) truncated ARP
- **116:110** (eapol) truncated EAP header
- **116:111** (eapol) EAP key truncated
- **116:112** (eapol) EAP header truncated
- **116:120** (pppoe) bad PPPOE frame detected
- **116:130** (vlan) bad VLAN frame
- **116:131** (vlan) bad LLC header
- **116:132** (vlan) bad extra LLC info
- **116:133** (wlan) bad 802.11 LLC header
- **116:134** (wlan) bad 802.11 extra LLC info
- **116:140** (token_ring) (token_ring) Bad Token Ring Header
- **116:141** (token_ring) (token_ring) Bad Token Ring ETHLLC Header
- **116:142** (token_ring) (token_ring) Bad Token Ring MRLENHeader
- **116:143** (token_ring) (token_ring) Bad Token Ring MR Header
- **116:150** (decode) bad traffic loopback IP
- **116:151** (decode) bad traffic same src/dst IP
- **116:160** (gre) GRE header length > payload length
- **116:161** (gre) multiple encapsulations in packet
- **116:162** (gre) invalid GRE version
- **116:163** (gre) invalid GRE header
- **116:164** (gre) invalid GRE v.1 PPTP header
- **116:165** (gre) GRE trans header length > payload length
- **116:170** (mpls) bad MPLS frame
- **116:171** (mpls) MPLS label 0 appears in non-bottom header
- **116:172** (mpls) MPLS label 1 appears in bottom header
- **116:173** (mpls) MPLS label 2 appears in non-bottom header
- **116:174** (mpls) MPLS label 3 appears in header
- **116:175** (mpls) MPLS label 4, 5,.. or 15 appears in header
- **116:176** (mpls) too many MPLS headers
- **116:250** (icmp4) ICMP original IP header truncated
- **116:251** (icmp4) ICMP version and original IP header versions differ
- **116:252** (icmp4) ICMP original datagram length < original IP header length
- **116:253** (icmp4) ICMP original IP payload < 64 bits
- **116:254** (icmp4) ICMP original IP payload > 576 bytes

- **116:255** (icmp4) ICMP original IP fragmented and offset not 0
- **116:270** (ipv6) IPv6 packet below TTL limit
- **116:271** (ipv6) IPv6 header claims to not be IPv6
- **116:272** (ipv6) IPV6 truncated extension header
- **116:273** (ipv6) IPV6 truncated header
- **116:274** (ipv6) IP dgm len < IP Hdr len
- **116:275** (ipv6) IP dgm len > captured len
- **116:276** (ipv6) IPv6 packet with destination address ::0
- **116:277** (ipv6) IPv6 packet with multicast source address
- **116:278** (ipv6) IPv6 packet with reserved multicast destination address
- **116:279** (ipv6) IPv6 header includes an undefined option type
- **116:280** (ipv6) IPv6 address includes an unassigned multicast scope value
- **116:281** (ipv6) IPv6 header includes an invalid value for the *next header* field
- **116:282** (ipv6) IPv6 header includes a routing extension header followed by a hop-by-hop header
- **116:283** (ipv6) IPv6 header includes two routing extension headers
- **116:285** (icmp6) ICMPv6 packet of type 2 (message too big) with MTU field < 1280
- **116:286** (icmp6) ICMPv6 packet of type 1 (destination unreachable) with non-RFC 2463 code
- **116:287** (icmp6) ICMPv6 router solicitation packet with a code not equal to 0
- **116:288** (icmp6) ICMPv6 router advertisement packet with a code not equal to 0
- **116:289** (icmp6) ICMPv6 router solicitation packet with the reserved field not equal to 0
- **116:290** (icmp6) ICMPv6 router advertisement packet with the reachable time field set > 1 hour
- **116:291** (ipv6) IPV6 tunneled over IPv4, IPv6 header truncated, possible Linux kernel attack
- **116:292** (ipv6) IPv6 header has destination options followed by a routing header
- **116:293** (decode) two or more IP (v4 and/or v6) encapsulation layers present
- **116:294** (esp) truncated encapsulated security payload header
- **116:295** (ipv6) IPv6 header includes an option which is too big for the containing header
- **116:296** (ipv6) IPv6 packet includes out-of-order extension headers
- **116:297** (gtp) two or more GTP encapsulation layers present
- **116:298** (gtp) GTP header length is invalid
- **116:400** (tcp) XMAS attack detected
- **116:401** (tcp) Nmap XMAS attack detected
- **116:402** (tcp) DOS NAPTHA vulnerability detected
- **116:403** (tcp) bad traffic SYN to multicast address
- **116:404** (ipv4) IPV4 packet with zero TTL
- **116:405** (ipv4) IPV4 packet with bad frag bits (both MF and DF set)

- **116:406** (udp) invalid IPv6 UDP packet, checksum zero
- **116:407** (ipv4) IPV4 packet frag offset + length exceed maximum
- **116:408** (ipv4) IPV4 packet from *current net* source address
- **116:409** (ipv4) IPV4 packet to *current net* dest address
- **116:410** (ipv4) IPV4 packet from multicast source address
- **116:411** (ipv4) IPV4 packet from reserved source address
- **116:412** (ipv4) IPV4 packet to reserved dest address
- **116:413** (ipv4) IPV4 packet from broadcast source address
- **116:414** (ipv4) IPV4 packet to broadcast dest address
- **116:415** (icmp4) ICMP4 packet to multicast dest address
- **116:416** (icmp4) ICMP4 packet to broadcast dest address
- **116:418** (icmp4) ICMP4 type other
- **116:419** (tcp) TCP urgent pointer exceeds payload length or no payload
- **116:420** (tcp) TCP SYN with FIN
- **116:421** (tcp) TCP SYN with RST
- **116:422** (tcp) TCP PDU missing ack for established session
- **116:423** (tcp) TCP has no SYN, ACK, or RST
- **116:424** (eth) truncated eth header
- **116:425** (ipv4) truncated IP4 header
- **116:426** (icmp4) truncated ICMP4 header
- **116:427** (icmp6) truncated ICMP6 header
- **116:428** (ipv4) IPV4 packet below TTL limit
- **116:429** (ipv6) IPV6 packet has zero hop limit
- **116:430** (ipv4) IPV4 packet both DF and offset set
- **116:431** (icmp6) ICMP6 type not decoded
- **116:432** (icmp6) ICMP6 packet to multicast address
- **116:433** (tcp) DDOS shaft SYN flood
- **116:434** (icmp4) ICMP ping NMAP
- **116:435** (icmp4) ICMP icmpenum v1.1.1
- **116:436** (icmp4) ICMP redirect host
- **116:437** (icmp4) ICMP redirect net
- **116:438** (icmp4) ICMP traceroute ipopts
- **116:439** (icmp4) ICMP source quench
- **116:440** (icmp4) broadscan smurf scanner
- **116:441** (icmp4) ICMP destination unreachable communication administratively prohibited

- **116:442** (icmp4) ICMP destination unreachable communication with destination host is administratively prohibited
- **116:443** (icmp4) ICMP destination unreachable communication with destination network is administratively prohibited
- **116:444** (ipv4) MISC IP option set
- **116:445** (udp) misc large UDP Packet
- **116:446** (tcp) BAD-TRAFFIC TCP port 0 traffic
- **116:447** (udp) BAD-TRAFFIC UDP port 0 traffic
- **116:448** (ipv4) BAD-TRAFFIC IP reserved bit set
- **116:449** (decode) BAD-TRAFFIC unassigned/reserved IP protocol
- **116:450** (decode) BAD-TRAFFIC bad IP protocol
- **116:451** (icmp4) ICMP path MTU denial of service attempt
- **116:452** (icmp4) BAD-TRAFFIC Linux ICMP header DOS attempt
- **116:453** (ipv6) BAD-TRAFFIC ISATAP-addressed IPv6 traffic spoofing attempt
- **116:454** (pgm) BAD-TRAFFIC PGM nak list overflow attempt
- **116:455** (igmp) DOS IGMP IP options validation attempt
- **116:456** (ipv6) too many IP6 extension headers
- **116:457** (icmp6) ICMPv6 packet of type 1 (destination unreachable) with non-RFC 4443 code
- **116:458** (ipv6) bogus fragmentation packet, possible BSD attack
- **116:459** (decode) fragment with zero length
- **116:460** (icmp6) ICMPv6 node info query/response packet with a code greater than 2
- **116:461** (ipv6) IPV6 routing type 0 extension header
- **116:462** (erspan2) ERSpan header version mismatch
- **116:463** (erspan2) captured < ERSpan type2 header length
- **116:464** (erspan3) captured < ERSpan type3 header length
- **116:465** (auth) truncated authentication header
- **116:466** (auth) bad authentication header length
- **116:467** (fabricpath) truncated FabricPath header
- **116:468** (decode) too many protocols present
- **119:1** (http_global) ascii encoding
- **119:2** (http_global) double decoding attack
- **119:3** (http_global) u encoding
- **119:4** (http_global) bare byte unicode encoding
- **119:5** (http_global) base36 encoding
- **119:6** (http_global) UTF-8 encoding
- **119:7** (http_global) IIS unicode codepoint encoding
- **119:8** (http_global) multi_slash encoding

- **119:9** (http_global) IIS backslash evasion
- **119:10** (http_global) self directory traversal
- **119:11** (http_global) directory traversal
- **119:12** (http_global) apache whitespace (tab)
- **119:13** (http_global) non-RFC http delimiter
- **119:14** (http_global) non-RFC defined char
- **119:15** (http_global) oversize request-URI directory
- **119:16** (http_global) oversize chunk encoding
- **119:17** (http_global) unauthorized proxy use detected
- **119:18** (http_global) webroot directory traversal
- **119:19** (http_global) long header
- **119:20** (http_global) max header fields
- **119:21** (http_global) multiple content length
- **119:22** (http_global) chunk size mismatch detected
- **119:23** (http_global) invalid ip in true-client-IP/XFF header
- **119:24** (http_global) multiple host hdrs detected
- **119:25** (http_global) hostname exceeds 255 characters
- **119:26** (http_global) header parsing space saturation
- **119:27** (http_global) client consecutive small chunk sizes
- **119:28** (http_global) post w/o content-length or chunks
- **119:29** (http_global) multiple true IPs in a session
- **119:30** (http_global) both true-client-IP and XFF hdrs present
- **119:31** (http_global) unknown method
- **119:32** (http_global) simple request
- **119:33** (http_global) unescaped space in http URI
- **119:34** (http_global) too many pipelined requests
- **120:1** (http_inspect) anomalous http server on undefined HTTP port
- **120:2** (http_inspect) invalid status code in HTTP response
- **120:3** (http_inspect) no content-length or transfer-encoding in HTTP response
- **120:4** (http_inspect) HTTP response has UTF charset which failed to normalize
- **120:5** (http_inspect) HTTP response has UTF-7 charset
- **120:6** (http_inspect) HTTP response gzip decompression failed
- **120:7** (http_inspect) server consecutive small chunk sizes
- **120:8** (http_inspect) invalid content-length or chunk size
- **120:9** (http_inspect) javascript obfuscation levels exceeds 1

- **120:10** (http_inspect) javascript whitespaces exceeds max allowed
- **120:11** (http_inspect) multiple encodings within javascript obfuscated data
- **120:12** (http_inspect) HTTP response SWF file zlib decompression failure
- **120:13** (http_inspect) HTTP response SWF file LZMA decompression failure
- **120:14** (http_inspect) HTTP response PDF file deflate decompression failure
- **120:15** (http_inspect) HTTP response PDF file unsupported compression type
- **120:16** (http_inspect) HTTP response PDF file cascaded compression
- **120:17** (http_inspect) HTTP response PDF file parse failure
- **122:1** (port_scan) TCP portscan
- **122:2** (port_scan) TCP decoy portscan
- **122:3** (port_scan) TCP portsweep
- **122:4** (port_scan) TCP distributed portscan
- **122:5** (port_scan) TCP filtered portscan
- **122:6** (port_scan) TCP filtered decoy portscan
- **122:7** (port_scan) TCP filtered portsweep
- **122:8** (port_scan) TCP filtered distributed portscan
- **122:9** (port_scan) IP protocol scan
- **122:10** (port_scan) IP decoy protocol scan
- **122:11** (port_scan) IP protocol sweep
- **122:12** (port_scan) IP distributed protocol scan
- **122:13** (port_scan) IP filtered protocol scan
- **122:14** (port_scan) IP filtered decoy protocol scan
- **122:15** (port_scan) IP filtered protocol sweep
- **122:16** (port_scan) IP filtered distributed protocol scan
- **122:17** (port_scan) UDP portscan
- **122:18** (port_scan) UDP decoy portscan
- **122:19** (port_scan) UDP portsweep
- **122:20** (port_scan) UDP distributed portscan
- **122:21** (port_scan) UDP filtered portscan
- **122:22** (port_scan) UDP filtered decoy portscan
- **122:23** (port_scan) UDP filtered portsweep
- **122:24** (port_scan) UDP filtered distributed portscan
- **122:25** (port_scan) ICMP sweep
- **122:26** (port_scan) ICMP filtered sweep
- **122:27** (port_scan) open port

- **123:1** (stream_ip) inconsistent IP options on fragmented packets
- **123:2** (stream_ip) teardrop attack
- **123:3** (stream_ip) short fragment, possible DOS attempt
- **123:4** (stream_ip) fragment packet ends after defragmented packet
- **123:5** (stream_ip) zero-byte fragment packet
- **123:6** (stream_ip) bad fragment size, packet size is negative
- **123:7** (stream_ip) bad fragment size, packet size is greater than 65536
- **123:8** (stream_ip) fragmentation overlap
- **123:11** (stream_ip) TTL value less than configured minimum, not using for reassembly
- **123:12** (stream_ip) excessive fragment overlap
- **123:13** (stream_ip) tiny fragment
- **124:1** (smtp) Attempted command buffer overflow
- **124:2** (smtp) Attempted data header buffer overflow
- **124:3** (smtp) Attempted response buffer overflow
- **124:4** (smtp) Attempted specific command buffer overflow
- **124:5** (smtp) Unknown command
- **124:6** (smtp) Illegal command
- **124:7** (smtp) Attempted header name buffer overflow
- **124:8** (smtp) Attempted X-Link2State command buffer overflow
- **124:10** (smtp) Base64 Decoding failed.
- **124:11** (smtp) Quoted-Printable Decoding failed.
- **124:13** (smtp) Unix-to-Unix Decoding failed.
- **124:14** (smtp) Cyrus SASL authentication attack.
- **125:1** (ftp_server) TELNET cmd on FTP command channel
- **125:2** (ftp_server) invalid FTP command
- **125:3** (ftp_server) FTP command parameters were too long
- **125:4** (ftp_server) FTP command parameters were malformed
- **125:5** (ftp_server) FTP command parameters contained potential string format
- **125:6** (ftp_server) FTP response message was too long
- **125:7** (ftp_server) FTP traffic encrypted
- **125:8** (ftp_server) FTP bounce attempt
- **125:9** (ftp_server) evasive (incomplete) TELNET cmd on FTP command channel
- **126:1** (telnet) consecutive telnet AYT commands beyond threshold
- **126:2** (telnet) telnet traffic encrypted
- **126:3** (telnet) telnet subnegotiation begin command without subnegotiation end

- **128:1** (ssh) Challenge-Response Overflow exploit
- **128:2** (ssh) SSH1 CRC32 exploit
- **128:3** (ssh) Server version string overflow
- **128:5** (ssh) Bad message direction
- **128:6** (ssh) Payload size incorrect for the given payload
- **128:7** (ssh) Failed to detect SSH version string
- **129:1** (stream_tcp) SYN on established session
- **129:2** (stream_tcp) data on SYN packet
- **129:3** (stream_tcp) data sent on stream not accepting data
- **129:4** (stream_tcp) TCP timestamp is outside of PAWS window
- **129:5** (stream_tcp) bad segment, adjusted size $\Leftarrow$ 0
- **129:6** (stream_tcp) window size (after scaling) larger than policy allows
- **129:7** (stream_tcp) limit on number of overlapping TCP packets reached
- **129:8** (stream_tcp) data sent on stream after TCP Reset sent
- **129:9** (stream_tcp) TCP client possibly hijacked, different ethernet address
- **129:10** (stream_tcp) TCP Server possibly hijacked, different ethernet address
- **129:11** (stream_tcp) TCP data with no TCP flags set
- **129:12** (stream_tcp) consecutive TCP small segments exceeding threshold
- **129:13** (stream_tcp) 4-way handshake detected
- **129:14** (stream_tcp) TCP timestamp is missing
- **129:15** (stream_tcp) reset outside window
- **129:16** (stream_tcp) FIN number is greater than prior FIN
- **129:17** (stream_tcp) ACK number is greater than prior FIN
- **129:18** (stream_tcp) data sent on stream after TCP Reset received
- **129:19** (stream_tcp) TCP window closed before receiving data
- **129:20** (stream_tcp) TCP session without 3-way handshake
- **131:1** (dns) Obsolete DNS RR Types
- **131:2** (dns) Experimental DNS RR Types
- **131:3** (dns) DNS Client rdata txt Overflow
- **136:1** (reputation) packets blacklisted
- **136:2** (reputation) Packets whitelisted
- **136:3** (reputation) Packets monitored
- **137:1** (ssl) Invalid Client HELLO after Server HELLO Detected
- **137:2** (ssl) Invalid Server HELLO without Client HELLO Detected
- **137:3** (ssl) Heartbeat Read Overrun Attempt Detected

- **137:4** (ssl) Large Heartbeat Response Detected
- **140:1** (sip) Maximum sessions reached
- **140:2** (sip) Empty request URI
- **140:3** (sip) URI is too long
- **140:4** (sip) Empty call-Id
- **140:5** (sip) Call-Id is too long
- **140:6** (sip) CSeq number is too large or negative
- **140:7** (sip) Request name in CSeq is too long
- **140:8** (sip) Empty From header
- **140:9** (sip) From header is too long
- **140:10** (sip) Empty To header
- **140:11** (sip) To header is too long
- **140:12** (sip) Empty Via header
- **140:13** (sip) Via header is too long
- **140:14** (sip) Empty Contact
- **140:15** (sip) Contact is too long
- **140:16** (sip) Content length is too large or negative
- **140:17** (sip) Multiple SIP messages in a packet
- **140:18** (sip) Content length mismatch
- **140:19** (sip) Request name is invalid
- **140:20** (sip) Invite replay attack
- **140:21** (sip) Illegal session information modification
- **140:22** (sip) Response status code is not a 3 digit number
- **140:23** (sip) Empty Content-type header
- **140:24** (sip) SIP version is invalid
- **140:25** (sip) Mismatch in METHOD of request and the CSEQ header
- **140:26** (sip) Method is unknown
- **140:27** (sip) Maximum dialogs within a session reached
- **141:1** (imap) Unknown IMAP3 command
- **141:2** (imap) Unknown IMAP3 response
- **141:4** (imap) Base64 Decoding failed.
- **141:5** (imap) Quoted-Printable Decoding failed.
- **141:7** (imap) Unix-to-Unix Decoding failed.
- **142:1** (pop) Unknown POP3 command
- **142:2** (pop) Unknown POP3 response

- **142:4** (pop) Base64 Decoding failed.
- **142:5** (pop) Quoted-Printable Decoding failed.
- **142:7** (pop) Unix-to-Unix Decoding failed.
- **143:1** (gtp_inspect) message length is invalid
- **143:2** (gtp_inspect) information element length is invalid
- **143:3** (gtp_inspect) information elements are out of order
- **144:1** (modbus) length in Modbus MBAP header does not match the length needed for the given function
- **144:2** (modbus) Modbus protocol ID is non-zero
- **144:3** (modbus) Reserved Modbus function code in use
- **145:1** (dnp3) DNP3 Link-Layer Frame contains bad CRC.
- **145:2** (dnp3) DNP3 Link-Layer Frame was dropped.
- **145:3** (dnp3) DNP3 Transport-Layer Segment was dropped during reassembly.
- **145:4** (dnp3) DNP3 Reassembly Buffer was cleared without reassembling a complete message.
- **145:5** (dnp3) DNP3 Link-Layer Frame uses a reserved address.
- **145:6** (dnp3) DNP3 Application-Layer Fragment uses a reserved function code.
- **219:1** (new_http_inspect) ascii encoding
- **219:2** (new_http_inspect) double decoding attack
- **219:3** (new_http_inspect) u encoding
- **219:4** (new_http_inspect) bare byte unicode encoding
- **219:5** (new_http_inspect) obsolete event—should not appear
- **219:6** (new_http_inspect) UTF-8 encoding
- **219:7** (new_http_inspect) IIS unicode codepoint encoding
- **219:8** (new_http_inspect) multi_slash encoding
- **219:9** (new_http_inspect) IIS backslash evasion
- **219:10** (new_http_inspect) self directory traversal
- **219:11** (new_http_inspect) directory traversal
- **219:12** (new_http_inspect) apache whitespace (tab)
- **219:13** (new_http_inspect) non-RFC http delimiter
- **219:14** (new_http_inspect) non-RFC defined char
- **219:15** (new_http_inspect) oversize request-uri directory
- **219:16** (new_http_inspect) oversize chunk encoding
- **219:17** (new_http_inspect) unauthorized proxy use detected
- **219:18** (new_http_inspect) webroot directory traversal
- **219:19** (new_http_inspect) long header
- **219:20** (new_http_inspect) max header fields

- **219:21** (new_http_inspect) multiple content length
- **219:22** (new_http_inspect) chunk size mismatch detected
- **219:23** (new_http_inspect) invalid IP in true-client-IP/XFF header
- **219:24** (new_http_inspect) multiple host hdrs detected
- **219:25** (new_http_inspect) hostname exceeds 255 characters
- **219:26** (new_http_inspect) header parsing space saturation
- **219:27** (new_http_inspect) client consecutive small chunk sizes
- **219:28** (new_http_inspect) post w/o content-length or chunks
- **219:29** (new_http_inspect) multiple true ips in a session
- **219:30** (new_http_inspect) both true-client-IP and XFF hdrs present
- **219:31** (new_http_inspect) unknown method
- **219:32** (new_http_inspect) simple request
- **219:33** (new_http_inspect) unescaped space in HTTP URI
- **219:34** (new_http_inspect) too many pipelined requests
- **219:35** (new_http_inspect) anomalous http server on undefined HTTP port
- **219:36** (new_http_inspect) invalid status code in HTTP response
- **219:37** (new_http_inspect) no content-length or transfer-encoding in HTTP response
- **219:38** (new_http_inspect) HTTP response has UTF charset which failed to normalize
- **219:39** (new_http_inspect) HTTP response has UTF-7 charset
- **219:40** (new_http_inspect) HTTP response gzip decompression failed
- **219:41** (new_http_inspect) server consecutive small chunk sizes
- **219:42** (new_http_inspect) invalid content-length or chunk size
- **219:43** (new_http_inspect) javascript obfuscation levels exceeds 1
- **219:44** (new_http_inspect) javascript whitespaces exceeds max allowed
- **219:45** (new_http_inspect) multiple encodings within javascript obfuscated data
- **219:46** (new_http_inspect) SWF file zlib decompression failure
- **219:47** (new_http_inspect) SWF file LZMA decompression failure
- **219:48** (new_http_inspect) PDF file deflate decompression failure
- **219:49** (new_http_inspect) PDF file unsupported compression type
- **219:50** (new_http_inspect) PDF file cascaded compression
- **219:51** (new_http_inspect) PDF file parse failure
- **219:52** (new_http_inspect) HTTP misformatted or not really HTTP
- **219:53** (new_http_inspect) Chunk length has excessive leading zeros
- **219:54** (new_http_inspect) White space before or between messages
- **219:55** (new_http_inspect) Request message without URI

- **219:56** (new_http_inspect) Control character in reason phrase
- **219:57** (new_http_inspect) Illegal extra whitespace in start line
- **219:58** (new_http_inspect) Corrupted HTTP version
- **219:59** (new_http_inspect) Unknown HTTP version
- **219:60** (new_http_inspect) Format error in HTTP header
- **219:61** (new_http_inspect) Chunk header options present
- **219:62** (new_http_inspect) URI badly formatted
- **219:63** (new_http_inspect) URI bad port number
- **219:64** (new_http_inspect) HTTP chunk misformatted
- **219:65** (new_http_inspect) White space following chunk length
- **219:67** (new_http_inspect) Excessive gzip compression
- **219:68** (new_http_inspect) Gzip decompression failed
- **256:1** (dpx) too much data sent to port

16.13 Command Set

no match

16.14 Signals

Important
Signal numbers are for the system that generated this documentation and are not applicable elsewhere.

- **hosts**(16): reload hosts file
- **int**(2): shutdown normally
- **quit**(3): shutdown as if started with --dirty-pig
- **reload**(1): reload config file
- **rotate**(31): rotate stats files
- **stats**(30): dump stats to stdout
- **term**(15): shutdown normally

16.15 Configuration Changes

```
change ->  dynamicdetection ==> 'snort.--plugin_path=<path>'
change ->  dynamicengine ==> 'snort.--plugin_path=<path>'
change ->  dynamicpreprocessor ==> 'snort.--plugin_path=<path>'
change ->  dynamicsidechannel ==> 'snort.--plugin_path=<path>'
change -> alertfile: 'config alertfile:' ==> 'alert_fast.file'
change -> alertfile: 'config alertfile:' ==> 'alert_full.file'
change -> attribute_table: 'STREAM_POLICY' ==> 'hosts: tcp_policy'
change -> attribute_table: 'filename <file_name>' ==> 'hosts[]'
change -> config ' addressspace_agnostic'  ==> ' packets. address_space_agnostic'
change -> config ' checksum_mode'  ==> ' network. checksum_eval'
change -> config ' daq'  ==> ' daq. type'
change -> config ' daq_dir'  ==> ' daq. dir'
change -> config ' daq_mode'  ==> ' daq. mode'
change -> config ' daq_var'  ==> ' daq. var'
change -> config ' detection_filter'  ==> ' alerts. detection_filter_memcap'
change -> config ' enable_deep_teredo_inspection'  ==> ' udp. deep_teredo_inspection'
change -> config ' event_filter'  ==> ' alerts. event_filter_memcap'
change -> config ' max_attribute_hosts'  ==> ' attribute_table. max_hosts'
change -> config ' max_attribute_services_per_host'  ==> ' attribute_table.  ↩
    max_services_per_host'
change -> config ' nopcre'  ==> ' detection. pcre_enable'
change -> config ' pkt_count'  ==> ' packets. limit'
change -> config ' rate_filter'  ==> ' alerts. rate_filter_memcap'
change -> config ' react'  ==> ' react. page'
change -> config ' threshold'  ==> ' alerts. event_filter_memcap'
change -> csv: 'dgmlen' ==> 'dgm_len'
change -> csv: 'dst' ==> 'dst_addr'
change -> csv: 'dstport' ==> 'dst_port'
change -> csv: 'ethdst' ==> 'eth_dst'
change -> csv: 'ethlen' ==> 'eth_len'
change -> csv: 'ethsrc' ==> 'eth_src'
change -> csv: 'ethtype' ==> 'eth_type'
change -> csv: 'icmpcode' ==> 'icmp_code'
change -> csv: 'icmpid' ==> 'icmp_id'
change -> csv: 'icmpseq' ==> 'icmp_seq'
change -> csv: 'icmptype' ==> 'icmp_type'
change -> csv: 'iplen' ==> 'ip_len'
change -> csv: 'sig_generator' ==> 'gid'
change -> csv: 'sig_id' ==> 'sid'
change -> csv: 'sig_rev' ==> 'rev'
change -> csv: 'src' ==> 'src_addr'
change -> csv: 'srcport' ==> 'src_port'
change -> csv: 'tcpack' ==> 'tcp_ack'
change -> csv: 'tcpflags' ==> 'tcp_flags'
change -> csv: 'tcplen' ==> 'tcp_len'
change -> csv: 'tcpseq' ==> 'tcp_seq'
change -> csv: 'tcpwindow' ==> 'tcp_win'
change -> csv: 'udplength' ==> 'udp_len'
change -> detection: 'ac' ==> 'ac_full_q'
change -> detection: 'ac-banded' ==> 'ac_banded'
change -> detection: 'ac-bnfa' ==> 'ac_bnfa_q'
change -> detection: 'ac-bnfa-nq' ==> 'ac_bnfa'
change -> detection: 'ac-bnfa-q' ==> 'ac_bnfa_q'
change -> detection: 'ac-nq' ==> 'ac_full'
change -> detection: 'ac-q' ==> 'ac_full_q'
change -> detection: 'ac-sparsebands' ==> 'ac_sparse_bands'
change -> detection: 'ac-split' ==> 'ac_full_q'
change -> detection: 'ac-split' ==> 'split_any_any'
change -> detection: 'ac-std' ==> 'ac_std'
change -> detection: 'acs' ==> 'ac_sparse'
```

```
change -> detection: 'bleedover-port-limit' ==> 'bleedover_port_limit'
change -> detection: 'intel-cpm' ==> 'intel_cpm'
change -> detection: 'lowmem' ==> 'lowmem_q'
change -> detection: 'lowmem-nq' ==> 'lowmem'
change -> detection: 'lowmem-q' ==> 'lowmem_q'
change -> detection: 'max-pattern-len' ==> 'max_pattern_len'
change -> detection: 'search-method' ==> 'search_method'
change -> detection: 'search-optimize' ==> 'search_optimize'
change -> detection: 'split-any-any' ==> 'split_any_any'
change -> dns: 'ports' ==> 'bindings'
change -> event_filter: 'gen_id' ==> 'gid'
change -> event_filter: 'sig_id' ==> 'sid'
change -> event_filter: 'threshold' ==> 'event_filter'
change -> file: 'config file: file_block_timeout' ==> 'block_timeout'
change -> file: 'config file: file_type_depth' ==> 'type_depth'
change -> file: 'config file: signature' ==> 'enable_signature'
change -> file: 'config file: type_id' ==> 'enable_type'
change -> frag3_engine: 'min_fragment_length' ==> 'min_frag_length'
change -> frag3_engine: 'overlap_limit' ==> 'max_overlaps'
change -> frag3_engine: 'policy bsd-right' ==> 'policy = bsd_right'
change -> frag3_engine: 'timeout' ==> 'session_timeout'
change -> ftp_telnet_protocol: 'alt_max_param_len' ==> 'cmd_validity'
change -> ftp_telnet_protocol: 'data_chan' ==> 'ignore_data_chan'
change -> ftp_telnet_protocol: 'ports' ==> 'bindings'
change -> gtp: 'ports' ==> 'gtp_ports'
change -> http_inspect: 'http_inspect' ==> 'http_global'
change -> http_inspect_server: 'apache_whitespace' ==> 'profile.apache_whitespace'
change -> http_inspect_server: 'ascii' ==> 'profile.ascii'
change -> http_inspect_server: 'bare_byte' ==> 'profile.bare_byte'
change -> http_inspect_server: 'chunk_length' ==> 'profile.chunk_length'
change -> http_inspect_server: 'client_flow_depth' ==> 'profile.client_flow_depth'
change -> http_inspect_server: 'directory' ==> 'profile.directory'
change -> http_inspect_server: 'double_decode' ==> 'profile.double_decode'
change -> http_inspect_server: 'enable_cookie' ==> 'enable_cookies'
change -> http_inspect_server: 'flow_depth' ==> 'server_flow_depth'
change -> http_inspect_server: 'http_inspect_server' ==> 'http_inspect'
change -> http_inspect_server: 'iis_backslash' ==> 'profile.iis_backslash'
change -> http_inspect_server: 'iis_delimiter' ==> 'profile.iis_delimiter'
change -> http_inspect_server: 'iis_unicode' ==> 'profile.iis_unicode'
change -> http_inspect_server: 'max_header_length' ==> 'profile.max_header_length'
change -> http_inspect_server: 'max_headers' ==> 'profile.max_headers'
change -> http_inspect_server: 'max_spaces' ==> 'profile.max_spaces'
change -> http_inspect_server: 'multi_slash' ==> 'profile.multi_slash'
change -> http_inspect_server: 'non_rfc_char' ==> 'non_rfc_chars'
change -> http_inspect_server: 'non_strict' ==> 'profile.non_strict'
change -> http_inspect_server: 'normalize_utf' ==> 'profile.normalize_utf'
change -> http_inspect_server: 'ports' ==> 'bindings'
change -> http_inspect_server: 'u_encode' ==> 'profile.u_encode'
change -> http_inspect_server: 'utf_8' ==> 'profile.utf_8'
change -> http_inspect_server: 'webroot' ==> 'profile.webroot'
change -> http_inspect_server: 'whitespace_chars' ==> 'profile.whitespace_chars'
change -> imap: 'ports' ==> 'bindings'
change -> paf_max: 'paf_max [0:63780]' ==> 'max_pdu [1460:63780]'
change -> perfmonitor: 'accumulate' ==> 'reset = false'
change -> perfmonitor: 'flow-file' ==> 'flow_file = true'
change -> perfmonitor: 'flow-ip' ==> 'flow_ip'
change -> perfmonitor: 'flow-ip-file' ==> 'flow_ip_file = true'
change -> perfmonitor: 'flow-ip-memcap' ==> 'flow_ip_memcap'
change -> perfmonitor: 'flow-ports' ==> 'flow_ports'
change -> perfmonitor: 'pktcnt' ==> 'packets'
change -> perfmonitor: 'snortfile' ==> 'file = true'
change -> perfmonitor: 'time' ==> 'seconds'
```

```
change -> policy_mode: 'inline_test' ==> 'inline-test'
change -> pop: 'ports' ==> 'bindings'
change -> ppm: 'max-pkt-time' ==> 'max_pkt_time'
change -> ppm: 'max-rule-time' ==> 'max_rule_time'
change -> ppm: 'pkt-log' ==> 'pkt_log'
change -> ppm: 'rule-log' ==> 'rule_log'
change -> ppm: 'suspend-timeout' ==> 'suspend_timeout'
change -> preprocessor 'normalize_ icmp4' ==> 'normalize. icmp4'
change -> preprocessor 'normalize_ icmp6' ==> 'normalize. icmp6'
change -> preprocessor 'normalize_ ip6' ==> 'normalize. ip6'
change -> profile: 'print' ==> 'count'
change -> rate_filter: 'gen_id' ==> 'gid'
change -> rate_filter: 'sig_id' ==> 'sid'
change -> rule_state: 'disabled' ==> 'enable'
change -> rule_state: 'enabled' ==> 'enable'
change -> sfportscan: 'proto' ==> 'protos'
change -> sfportscan: 'scan_type' ==> 'scan_types'
change -> sip: 'ports' ==> 'bindings'
change -> smtp: 'ports' ==> 'bindings'
change -> ssh: 'server_ports' ==> 'bindings'
change -> ssl: 'ports' ==> 'bindings'
change -> stream5_global: 'max_active_responses' ==> 'max_responses'
change -> stream5_global: 'max_icmp' ==> 'max_sessions'
change -> stream5_global: 'max_ip' ==> 'max_sessions'
change -> stream5_global: 'max_tcp' ==> 'max_sessions'
change -> stream5_global: 'max_udp' ==> 'max_sessions'
change -> stream5_global: 'min_response_seconds' ==> 'min_interval'
change -> stream5_global: 'prune_log_max' ==> 'histogram'
change -> stream5_global: 'tcp_cache_nominal_timeout' ==> 'pruning_timeout'
change -> stream5_global: 'tcp_cache_pruning_timeout' ==> 'idle_timeout'
change -> stream5_global: 'udp_cache_nominal_timeout' ==> 'idle_timeout'
change -> stream5_global: 'udp_cache_pruning_timeout' ==> 'pruning_timeout'
change -> stream5_ip: 'timeout' ==> 'session_timeout'
change -> stream5_tcp: 'bind_to' ==> 'bindings'
change -> stream5_tcp: 'dont_reassemble_async' ==> 'reassemble_async'
change -> stream5_tcp: 'max_queued_bytes' ==> 'queue_limit.max_bytes'
change -> stream5_tcp: 'max_queued_segs' ==> 'queue_limit.max_segments'
change -> stream5_tcp: 'policy hpux' ==> 'stream_tcp.policy = hpux11'
change -> stream5_tcp: 'timeout' ==> 'session_timeout'
change -> stream5_tcp: 'use_static_footprint_sizes' ==> 'footprint'
change -> stream5_udp: 'timeout' ==> 'session_timeout'
change -> suppress: 'gen_id' ==> 'gid'
change -> suppress: 'sig_id' ==> 'sid'
change -> syslog: 'log_alert' ==> 'level = alert'
change -> syslog: 'log_auth' ==> 'facility = auth'
change -> syslog: 'log_authpriv' ==> 'facility = authpriv'
change -> syslog: 'log_cons' ==> 'options = cons'
change -> syslog: 'log_crit' ==> 'level = crit'
change -> syslog: 'log_daemon' ==> 'facility = daemon'
change -> syslog: 'log_debug' ==> 'level = debug'
change -> syslog: 'log_emerg' ==> 'level = emerg'
change -> syslog: 'log_err' ==> 'level = err'
change -> syslog: 'log_info' ==> 'level = info'
change -> syslog: 'log_local0' ==> 'facility = local0'
change -> syslog: 'log_local1' ==> 'facility = local1'
change -> syslog: 'log_local2' ==> 'facility = local2'
change -> syslog: 'log_local3' ==> 'facility = local3'
change -> syslog: 'log_local4' ==> 'facility = local4'
change -> syslog: 'log_local5' ==> 'facility = local5'
change -> syslog: 'log_local6' ==> 'facility = local6'
change -> syslog: 'log_local7' ==> 'facility = local7'
change -> syslog: 'log_ndelay' ==> 'options = ndelay'
```

```
change -> syslog: 'log_notice' ==> 'level = notice'
change -> syslog: 'log_perror' ==> 'options = perror'
change -> syslog: 'log_pid' ==> 'options = pid'
change -> syslog: 'log_user' ==> 'facility = user'
change -> syslog: 'log_warning' ==> 'level = warning'
change -> threshold: 'ips_option: threshold' ==> 'event_filter'
change -> unified2: ' alert_unified2' ==> 'unified2'
change -> unified2: ' log_unified2' ==> 'unified2'
change -> unified2: ' unified2' ==> 'unified2'
deleted -> arpspoof: 'unicast'
deleted -> attribute_table: '<FRAG_POLICY>hpux</FRAG_POLICY>'
deleted -> attribute_table: '<FRAG_POLICY>irix</FRAG_POLICY>'
deleted -> attribute_table: '<FRAG_POLICY>old-linux</FRAG_POLICY>'
deleted -> attribute_table: '<FRAG_POLICY>unknown</FRAG_POLICY>'
deleted -> attribute_table: '<STREAM_POLICY>noack</STREAM_POLICY>'
deleted -> attribute_table: '<STREAM_POLICY>unknown</STREAM_POLICY>'
deleted -> config ' cs_dir'
deleted -> config ' disable_attribute_reload_thread'
deleted -> config ' disable_decode_alerts'
deleted -> config ' disable_decode_drops'
deleted -> config ' disable_ipopt_alerts'
deleted -> config ' disable_ipopt_drops'
deleted -> config ' disable_tcpopt_alerts'
deleted -> config ' disable_tcpopt_drops'
deleted -> config ' disable_tcpopt_experimental_alerts'
deleted -> config ' disable_tcpopt_experimental_drops'
deleted -> config ' disable_tcpopt_obsolete_alerts'
deleted -> config ' disable_tcpopt_obsolete_drops'
deleted -> config ' disable_tcpopt_ttcp_alerts'
deleted -> config ' disable_ttcp_alerts'
deleted -> config ' disable_ttcp_drops'
deleted -> config ' dump_dynamic_rules_path'
deleted -> config ' enable_decode_drops'
deleted -> config ' enable_decode_oversized_alerts'
deleted -> config ' enable_decode_oversized_drops'
deleted -> config ' enable_ipopt_drops'
deleted -> config ' enable_tcpopt_drops'
deleted -> config ' enable_tcpopt_experimental_drops'
deleted -> config ' enable_tcpopt_obsolete_drops'
deleted -> config ' enable_tcpopt_ttcp_drops'
deleted -> config ' enable_ttcp_drops'
deleted -> config ' flexresp2_attempts'
deleted -> config ' flexresp2_interface'
deleted -> config ' flexresp2_memcap'
deleted -> config ' flexresp2_rows'
deleted -> config ' flowbits_size'
deleted -> config ' include_vlan_in_alerts'
deleted -> config ' interface'
deleted -> config ' layer2resets'
deleted -> config ' policy_version'
deleted -> config ' so_rule_memcap'
deleted -> csv: '<filename> can no longer be specific'
deleted -> csv: 'default'
deleted -> csv: 'trheader'
deleted -> detection: 'mwm'
deleted -> dns: 'enable_experimental_types'
deleted -> dns: 'enable_obsolete_types'
deleted -> dns: 'enable_rdata_overflow'
deleted -> fast: '<filename> can no longer be specific'
deleted -> frag3_engine: 'detect_anomalies'
deleted -> frag3_global: 'disabled'
deleted -> ftp_telnet_protocol: 'detect_anomalies'
```

```
deleted -> full: '<filename> can no longer be specific'
deleted -> http_inspect: 'disabled'
deleted -> http_inspect_server: 'no_alerts'
deleted -> imap: 'disabled'
deleted -> imap: 'max_mime_mem'
deleted -> imap: 'memcap'
deleted -> perfmonitor: 'atexitonly'
deleted -> perfmonitor: 'atexitonly: base-stats'
deleted -> perfmonitor: 'atexitonly: events-stats'
deleted -> perfmonitor: 'atexitonly: flow-ip-stats'
deleted -> perfmonitor: 'atexitonly: flow-stats'
deleted -> pop: 'disabled'
deleted -> pop: 'max_mime_mem'
deleted -> pop: 'memcap'
deleted -> ppm: 'debug-pkts'
deleted -> react: 'block'
deleted -> react: 'warn'
deleted -> rpc_decode: 'alert_fragments'
deleted -> rpc_decode: 'no_alert_incomplete'
deleted -> rpc_decode: 'no_alert_large_fragments'
deleted -> rpc_decode: 'no_alert_multiple_requests'
deleted -> rule_state: 'action'
deleted -> sfportscan: 'detect_ack_scans'
deleted -> sfportscan: 'disabled'
deleted -> sfportscan: 'logfile'
deleted -> sip: 'disabled'
deleted -> smtp: 'alert_unknown_cmds'
deleted -> smtp: 'disabled'
deleted -> smtp: 'enable_mime_decoding'
deleted -> smtp: 'inspection_type'
deleted -> smtp: 'max_mime_depth'
deleted -> smtp: 'max_mime_mem'
deleted -> smtp: 'memcap'
deleted -> smtp: 'no_alerts'
deleted -> smtp: 'print_cmds'
deleted -> ssh: 'autodetect'
deleted -> ssh: 'enable_badmsgdir'
deleted -> ssh: 'enable_paysize'
deleted -> ssh: 'enable_protomismatch'
deleted -> ssh: 'enable_recognition'
deleted -> ssh: 'enable_respoverflow'
deleted -> ssh: 'enable_srvoverflow'
deleted -> ssh: 'enable_ssh1crc32'
deleted -> ssl: 'noinspect_encrypted'
deleted -> stream5_global: 'disabled'
deleted -> stream5_global: 'flush_on_alert'
deleted -> stream5_global: 'no_midstream_drop_alerts'
deleted -> stream5_tcp: 'check_session_hijacking'
deleted -> stream5_tcp: 'detect_anomalies'
deleted -> stream5_tcp: 'dont_store_large_packets'
deleted -> stream5_tcp: 'policy noack'
deleted -> stream5_tcp: 'policy unknown'
deleted -> tcpdump: '<filename> can no longer be specific'
deleted -> test: 'file'
deleted -> test: 'stdout'
deleted -> unified2: 'filename'
```

16.16 Module Listing

- **ack** (ips_option): rule option to match on TCP ack numbers

- **active** (basic): configure responses
- **alert_csv** (logger): output event in csv format
- **alert_ex** (logger): output gid:sid:rev for alerts
- **alert_fast** (logger): output event with brief text format
- **alert_full** (logger): output event with full packet dump
- **alert_syslog** (logger): output event to syslog
- **alerts** (basic): configure alerts
- **arp** (codec): support for address resolution protocol
- **arp_spoof** (inspector): detect ARP attacks and anomalies
- **asn1** (ips_option): rule option for asn1 detection
- **attribute_table** (basic): configure hosts loading
- **auth** (codec): support for IP authentication header
- **back_orifice** (inspector): back orifice detection
- **base64_decode** (ips_option): rule option to decode base64 data - must be used with base64_data option
- **binder** (inspector): configure processing based on CIDRs, ports, services, etc.
- **bufferlen** (ips_option): rule option to check length of current buffer
- **byte_extract** (ips_option): rule option to convert data to an integer variable
- **byte_jump** (ips_option): rule option to move the detection cursor
- **byte_test** (ips_option): rule option to convert data to integer and compare
- **classifications** (basic): define rule categories with priority
- **classtype** (ips_option): general rule option for rule classification
- **content** (ips_option): payload rule option for basic pattern matching
- **cvs** (ips_option): payload rule option for detecting specific attacks
- **daq** (basic): configure packet acquisition interface
- **data_log** (inspector): log selected published data to data.log
- **decode** (basic): general decoder rules
- **detection** (basic): configure general IPS rule processing parameters
- **detection_filter** (ips_option): rule option to require multiple hits before a rule generates an event
- **dnp3** (inspector): dnp3 inspection
- **dnp3_data** (ips_option): sets the cursor to dnp3 data
- **dnp3_func** (ips_option): detection option to check dnp3 function code
- **dnp3_ind** (ips_option): detection option to check dnp3 indicator flags
- **dnp3_obj** (ips_option): detection option to check dnp3 object headers
- **dns** (inspector): dns inspection
- **dpx** (inspector): dynamic inspector example

- **dsize** (ips_option): rule option to test payload size
- **eapol** (codec): support for extensible authentication protocol over LAN
- **erspan2** (codec): support for encapsulated remote switched port analyzer - type 2
- **erspan3** (codec): support for encapsulated remote switched port analyzer - type 3
- **esp** (codec): support for encapsulating security payload
- **eth** (codec): support for ethernet protocol (DLT 1) (DLT 51)
- **event_filter** (basic): configure thresholding of events
- **event_queue** (basic): configure event queue parameters
- **fabricpath** (codec): support for fabricpath
- **file_data** (ips_option): rule option to set detection cursor to file data
- **file_id** (basic): configure file identification
- **flags** (ips_option): rule option to test TCP control flags
- **flow** (ips_option): rule option to check session properties
- **flowbits** (ips_option): rule option to set and test arbitrary boolean flags
- **fragbits** (ips_option): rule option to test IP frag flags
- **fragoffset** (ips_option): rule option to test IP frag offset
- **ftp_client** (inspector): FTP client configuration module for use with ftp_server
- **ftp_data** (inspector): FTP data channel handler
- **ftp_server** (inspector): main FTP module; ftp_client should also be configured
- **gid** (ips_option): rule option specifying rule generator
- **gre** (codec): support for generic routing encapsulation
- **gtp** (codec): support for general-packet-radio-service tunnelling protocol
- **gtp_info** (ips_option): rule option to check gtp info element
- **gtp_inspect** (inspector): gtp control channel inspection
- **gtp_type** (ips_option): rule option to check gtp types
- **gtp_version** (ips_option): rule option to check gtp version
- **hosts** (basic): configure hosts
- **http_client_body** (ips_option): rule option to set the detection cursor to the request body
- **http_cookie** (ips_option): rule option to set the detection cursor to the HTTP cookie
- **http_global** (inspector): http inspector global configuration and client rules for use with http_server
- **http_header** (ips_option): rule option to set the detection cursor to the normalized header(s)
- **http_inspect** (inspector): http inspection and server rules; also configure http_inspect
- **http_method** (ips_option): rule option to set the detection cursor to the HTTP request method
- **http_raw_cookie** (ips_option): rule option to set the detection cursor to the unnormalized cookie
- **http_raw_header** (ips_option): rule option to set the detection cursor to the unnormalized headers

- **http_raw_uri** (ips_option): rule option to set the detection cursor to the unnormalized URI
- **http_stat_code** (ips_option): rule option to set the detection cursor to the HTTP status code
- **http_stat_msg** (ips_option): rule option to set the detection cursor to the HTTP status message
- **http_uri** (ips_option): rule option to set the detection cursor to the normalized URI buffer
- **icmp4** (codec): support for Internet control message protocol v4
- **icmp6** (codec): support for Internet control message protocol v6
- **icmp_id** (ips_option): rule option to check ICMP ID
- **icmp_seq** (ips_option): rule option to check ICMP sequence number
- **icode** (ips_option): rule option to check ICMP code
- **id** (ips_option): rule option to check the IP ID field
- **igmp** (codec): support for Internet group management protocol
- **imap** (inspector): imap inspection
- **ip_proto** (ips_option): rule option to check the IP protocol number
- **ipopts** (ips_option): rule option to check for IP options
- **ips** (basic): configure IPS rule processing
- **ipv4** (codec): support for Internet protocol v4
- **ipv6** (codec): support for Internet protocol v6
- **isdataat** (ips_option): rule option to check for the presence of payload data
- **itype** (ips_option): rule option to check ICMP type
- **log_codecs** (logger): log protocols in packet by layer
- **log_hext** (logger): output payload suitable for daq hext
- **log_pcap** (logger): log packet in pcap format
- **md5** (ips_option): payload rule option for hash matching
- **metadata** (ips_option): rule option for conveying arbitrary name, value data within the rule text
- **modbus** (inspector): modbus inspection
- **modbus_data** (ips_option): rule option to set cursor to modbus data
- **modbus_func** (ips_option): rule option to check modbus function code
- **modbus_unit** (ips_option): rule option to check modbus unit ID
- **mpls** (codec): support for multiprotocol label switching
- **msg** (ips_option): rule option summarizing rule purpose output with events
- **network** (basic): configure basic network parameters
- **new_http_inspect** (inspector): new HTTP inspector
- **normalizer** (inspector): packet scrubbing for inline mode
- **output** (basic): configure general output parameters
- **packets** (basic): configure basic packet handling

- **pcre** (ips_option): rule option for matching payload data with pcre
- **perf_monitor** (inspector): performance monitoring and flow statistics collection
- **pgm** (codec): support for pragmatic general multicast
- **pkt_data** (ips_option): rule option to set the detection cursor to the normalized packet data
- **pkt_num** (ips_option): alert on raw packet number
- **pop** (inspector): pop inspection
- **port_scan** (inspector): port scan inspector; also configure port_scan_global
- **port_scan_global** (inspector): shared settings for port_scan inspectors for use with port_scan
- **pppoe** (codec): support for point-to-point protocol over ethernet
- **priority** (ips_option): rule option for prioritizing events
- **process** (basic): configure basic process setup
- **profiler** (basic): configure profiling of rules and/or modules
- **rate_filter** (basic): configure rate filters (which change rule actions)
- **raw_data** (ips_option): rule option to set the detection cursor to the raw packet data
- **react** (ips_action): send response to client and terminate session
- **reference** (ips_option): rule option to indicate relevant attack identification system
- **references** (basic): define reference systems used in rules
- **regex** (ips_option): rule option for matching payload data with hyperscan regex
- **reject** (ips_action): terminate session with TCP reset or ICMP unreachable
- **rem** (ips_option): rule option to convey an arbitrary comment in the rule body
- **replace** (ips_option): rule option to overwrite payload data; use with rewrite action
- **reputation** (inspector): reputation inspection
- **rev** (ips_option): rule option to indicate current revision of signature
- **rewrite** (ips_action): overwrite packet contents
- **rpc** (ips_option): rule option to check SUNRPC CALL parameters
- **rpc_decode** (inspector): RPC inspector
- **rule_state** (basic): enable/disable specific IPS rules
- **search_engine** (basic): configure fast pattern matcher
- **seq** (ips_option): rule option to check TCP sequence number
- **session** (ips_option): rule option to check user data from TCP sessions
- **sha256** (ips_option): payload rule option for hash matching
- **sha512** (ips_option): payload rule option for hash matching
- **sid** (ips_option): rule option to indicate signature number
- **sip** (inspector): sip inspection
- **sip_body** (ips_option): rule option to set the detection cursor to the request body

- **sip_header** (ips_option): rule option to set the detection cursor to the SIP header buffer
- **sip_method** (ips_option): detection option for sip stat code
- **sip_stat_code** (ips_option): detection option for sip stat code
- **smtp** (inspector): smtp inspection
- **snort** (basic): command line configuration
- **so** (ips_option): rule option to call custom eval function
- **soid** (ips_option): rule option to specify a shared object rule ID
- **ssh** (inspector): ssh inspection
- **ssl** (inspector): ssl inspection
- **ssl_state** (ips_option): detection option for ssl state
- **ssl_version** (ips_option): detection option for ssl version
- **stream** (inspector): common flow tracking
- **stream_file** (inspector): stream inspector for file flow tracking and processing
- **stream_icmp** (inspector): stream inspector for ICMP flow tracking
- **stream_ip** (inspector): stream inspector for IP flow tracking and defragmentation
- **stream_reassemble** (ips_option): detection option for stream reassembly control
- **stream_size** (ips_option): detection option for stream size checking
- **stream_tcp** (inspector): stream inspector for TCP flow tracking and stream normalization and reassembly
- **stream_udp** (inspector): stream inspector for UDP flow tracking
- **stream_user** (inspector): stream inspector for user flow tracking and reassembly
- **suppress** (basic): configure event suppressions
- **tag** (ips_option): rule option to log additional packets
- **tcp** (codec): support for transmission control protocol
- **telnet** (inspector): telnet inspection and normalization
- **token_ring** (codec): support for token ring decoding
- **tos** (ips_option): rule option to check type of service field
- **ttl** (ips_option): rule option to check time to live field
- **udp** (codec): support for user datagram protocol
- **unified2** (logger): output event and packet in unified2 format file
- **urg** (ips_option): detection for TCP urgent pointer
- **vlan** (codec): support for local area network
- **window** (ips_option): rule option to check TCP window field
- **wizard** (inspector): inspector that implements port-independent protocol identification
- **wlan** (codec): support for wireless local area network protocol (DLT 105) :leveloffset: 0

16.16.1 Plugin Listing

- **codec::arp**: support for address resolution protocol
- **codec::auth**: support for IP authentication header
- **codec::eapol**: support for extensible authentication protocol over LAN
- **codec::erspan2**: support for encapsulated remote switched port analyzer - type 2
- **codec::erspan3**: support for encapsulated remote switched port analyzer - type 3
- **codec::esp**: support for encapsulating security payload
- **codec::eth**: support for ethernet protocol (DLT 1) (DLT 51)
- **codec::fabricpath**: support for fabricpath
- **codec::gre**: support for generic routing encapsulation
- **codec::gtp**: support for general-packet-radio-service tunnelling protocol
- **codec::i4l_rawip**: support for I4L IP
- **codec::icmp4**: support for Internet control message protocol v4
- **codec::icmp4_ip**: support for IP in ICMPv4
- **codec::icmp6**: support for Internet control message protocol v6
- **codec::icmp6_ip**: support for IP in ICMPv6
- **codec::igmp**: support for Internet group management protocol
- **codec::ipv4**: support for Internet protocol v4
- **codec::ipv6**: support for Internet protocol v6
- **codec::ipv6_dst_opts**: support for ipv6 destination options
- **codec::ipv6_frag**: support for IPv6 fragment decoding
- **codec::ipv6_hop_opts**: support for IPv6 hop options
- **codec::ipv6_mobility**: support for mobility
- **codec::ipv6_no_next**: sentinel codec
- **codec::ipv6_routing**: support for IPv6 routing extension
- **codec::linux_sll**: support for Linux SLL (DLT 113)
- **codec::llc**: support for logical link control
- **codec::mpls**: support for multiprotocol label switching
- **codec::null**: support for null encapsulation (DLT 0)
- **codec::pflog**: support for OpenBSD PF log (DLT 117)
- **codec::pgm**: support for pragmatic general multicast
- **codec::pim**: support for protocol independent multicast
- **codec::ppp**: support for point-to-point encapsulation (DLT DLT_PPP)
- **codec::ppp_encap**: support for point-to-point encapsulation
- **codec::pppoe_disc**: support for point-to-point discovery

- **codec::pppoe_sess**: support for point-to-point session
- **codec::raw4**: support for unencapsulated IPv4 (DLT 12) (DLT 228)
- **codec::raw6**: support for unencapsulated IPv6 (DLT 229)
- **codec::slip**: support for slip protocol (DLT 8)
- **codec::sun_nd**: support for Sun ND
- **codec::swipe**: support for Swipe
- **codec::tcp**: support for transmission control protocol
- **codec::teredo**: support for teredo
- **codec::token_ring**: support for token ring decoding
- **codec::trans_bridge**: support for trans-bridging
- **codec::udp**: support for user datagram protocol
- **codec::user**: support for user sessions (DLT 230)
- **codec::vlan**: support for local area network
- **codec::wlan**: support for wireless local area network protocol (DLT 105)
- **inspector::arp_spoof**: detect ARP attacks and anomalies
- **inspector::back_orifice**: back orifice detection
- **inspector::binder**: configure processing based on CIDRs, ports, services, etc.
- **inspector::data_log**: log selected published data to data.log
- **inspector::dnp3**: dnp3 inspection
- **inspector::dns**: dns inspection
- **inspector::dpx**: dynamic inspector example
- **inspector::ftp_client**: FTP inspector client module
- **inspector::ftp_data**: FTP data channel handler
- **inspector::ftp_server**: FTP inspector server module
- **inspector::gtp_inspect**: gtp control channel inspection
- **inspector::http_global**: shared HTTP inspector settings
- **inspector::http_inspect**: main HTTP inspector module
- **inspector::imap**: imap inspection
- **inspector::modbus**: modbus inspection
- **inspector::new_http_inspect**: the new HTTP inspector!
- **inspector::normalizer**: packet scrubbing for inline mode
- **inspector::perf_monitor**: performance monitoring and flow statistics collection
- **inspector::pop**: pop inspection
- **inspector::port_scan**: port scan inspector; also configure port_scan_global
- **inspector::port_scan_global**: shared settings for port_scan inspectors for use with port_scan

- **inspector::reputation**: reputation inspection
- **inspector::rpc_decode**: RPC inspector
- **inspector::sip**: sip inspection
- **inspector::smtp**: smtp inspection
- **inspector::ssh**: ssh inspection
- **inspector::ssl**: ssl inspection
- **inspector::stream**: common flow tracking
- **inspector::stream_file**: stream inspector for file flow tracking and processing
- **inspector::stream_icmp**: stream inspector for ICMP flow tracking
- **inspector::stream_ip**: stream inspector for IP flow tracking and defragmentation
- **inspector::stream_tcp**: stream inspector for TCP flow tracking and stream normalization and reassembly
- **inspector::stream_udp**: stream inspector for UDP flow tracking
- **inspector::stream_user**: stream inspector for user flow tracking and reassembly
- **inspector::telnet**: telnet inspection and normalization
- **inspector::wizard**: inspector that implements port-independent protocol identification
- **ips_action::react**: send response to client and terminate session
- **ips_action::reject**: terminate session with TCP reset or ICMP unreachable
- **ips_action::rewrite**: overwrite packet contents
- **ips_option::ack**: rule option to match on TCP ack numbers
- **ips_option::asn1**: rule option for asn1 detection
- **ips_option::base64_data**: set detection cursor to decoded Base64 data
- **ips_option::base64_decode**: rule option to decode base64 data - must be used with base64_data option
- **ips_option::bufferlen**: rule option to check length of current buffer
- **ips_option::byte_extract**: rule option to convert data to an integer variable
- **ips_option::byte_jump**: rule option to move the detection cursor
- **ips_option::byte_test**: rule option to convert data to integer and compare
- **ips_option::classtype**: general rule option for rule classification
- **ips_option::content**: payload rule option for basic pattern matching
- **ips_option::cvs**: payload rule option for detecting specific attacks
- **ips_option::detection_filter**: rule option to require multiple hits before a rule generates an event
- **ips_option::dnp3_data**: sets the cursor to dnp3 data
- **ips_option::dnp3_func**: detection option to check dnp3 function code
- **ips_option::dnp3_ind**: detection option to check dnp3 indicator flags
- **ips_option::dnp3_obj**: detection option to check dnp3 object headers
- **ips_option::dsize**: rule option to test payload size

- **ips_option::file_data**: rule option to set detection cursor to file data
- **ips_option::flags**: rule option to test TCP control flags
- **ips_option::flow**: rule option to check session properties
- **ips_option::flowbits**: rule option to set and test arbitrary boolean flags
- **ips_option::fragbits**: rule option to test IP frag flags
- **ips_option::fragoffset**: rule option to test IP frag offset
- **ips_option::gid**: rule option specifying rule generator
- **ips_option::gtp_info**: rule option to check gtp info element
- **ips_option::gtp_type**: rule option to check gtp types
- **ips_option::gtp_version**: rule option to check gtp version
- **ips_option::http_client_body**: rule option to set the detection cursor to the request body
- **ips_option::http_cookie**: rule option to set the detection cursor to the HTTP cookie
- **ips_option::http_header**: rule option to set the detection cursor to the normalized header(s)
- **ips_option::http_method**: rule option to set the detection cursor to the HTTP request method
- **ips_option::http_raw_cookie**: rule option to set the detection cursor to the unnormalized cookie
- **ips_option::http_raw_header**: rule option to set the detection cursor to the unnormalized headers
- **ips_option::http_raw_uri**: rule option to set the detection cursor to the unnormalized URI
- **ips_option::http_stat_code**: rule option to set the detection cursor to the HTTP status code
- **ips_option::http_stat_msg**: rule option to set the detection cursor to the HTTP status message
- **ips_option::http_uri**: rule option to set the detection cursor to the normalized URI buffer
- **ips_option::icmp_id**: rule option to check ICMP ID
- **ips_option::icmp_seq**: rule option to check ICMP sequence number
- **ips_option::icode**: rule option to check ICMP code
- **ips_option::id**: rule option to check the IP ID field
- **ips_option::ip_proto**: rule option to check the IP protocol number
- **ips_option::ipopts**: rule option to check for IP options
- **ips_option::isdataat**: rule option to check for the presence of payload data
- **ips_option::itype**: rule option to check ICMP type
- **ips_option::md5**: payload rule option for hash matching
- **ips_option::metadata**: rule option for conveying arbitrary name, value data within the rule text
- **ips_option::modbus_data**: rule option to set cursor to modbus data
- **ips_option::modbus_func**: rule option to check modbus function code
- **ips_option::modbus_unit**: rule option to check modbus unit ID
- **ips_option::msg**: rule option summarizing rule purpose output with events
- **ips_option::pcre**: rule option for matching payload data with pcre

- **ips_option::pkt_data**: rule option to set the detection cursor to the normalized packet data
- **ips_option::pkt_num**: alert on raw packet number
- **ips_option::priority**: rule option for prioritizing events
- **ips_option::raw_data**: rule option to set the detection cursor to the raw packet data
- **ips_option::reference**: rule option to indicate relevant attack identification system
- **ips_option::regex**: rule option for matching payload data with hyperscan regex
- **ips_option::rem**: rule option to convey an arbitrary comment in the rule body
- **ips_option::replace**: rule option to overwrite payload data; use with rewrite action
- **ips_option::rev**: rule option to indicate current revision of signature
- **ips_option::rpc**: rule option to check SUNRPC CALL parameters
- **ips_option::seq**: rule option to check TCP sequence number
- **ips_option::session**: rule option to check user data from TCP sessions
- **ips_option::sha256**: payload rule option for hash matching
- **ips_option::sha512**: payload rule option for hash matching
- **ips_option::sid**: rule option to indicate signature number
- **ips_option::sip_body**: rule option to set the detection cursor to the request body
- **ips_option::sip_header**: rule option to set the detection cursor to the SIP header buffer
- **ips_option::sip_method**: detection option for sip stat code
- **ips_option::sip_stat_code**: detection option for sip stat code
- **ips_option::so**: rule option to call custom eval function
- **ips_option::soid**: rule option to specify a shared object rule ID
- **ips_option::ssl_state**: detection option for ssl state
- **ips_option::ssl_version**: detection option for ssl version
- **ips_option::stream_reassemble**: detection option for stream reassembly control
- **ips_option::stream_size**: detection option for stream size checking
- **ips_option::tag**: rule option to log additional packets
- **ips_option::tos**: rule option to check type of service field
- **ips_option::ttl**: rule option to check time to live field
- **ips_option::urg**: detection for TCP urgent pointer
- **ips_option::window**: rule option to check TCP window field
- **logger::alert_csv**: output event in csv format
- **logger::alert_ex**: output gid:sid:rev for alerts
- **logger::alert_fast**: output event with brief text format
- **logger::alert_full**: output event with full packet dump
- **logger::alert_syslog**: output event to syslog

- **logger::log_codecs**: log protocols in packet by layer
- **logger::log_hext**: output payload suitable for daq hext
- **logger::log_null**: disable logging of packets
- **logger::log_pcap**: log packet in pcap format
- **logger::unified2**: output event and packet in unified2 format file
- **search_engine::ac_banded**: Aho-Corasick Banded (high memory, moderate performance)
- **search_engine::ac_bnfa**: Aho-Corasick Binary NFA (low memory, high performance) MPSE
- **search_engine::ac_full**: Aho-Corasick Full (high memory, best performance), implements search_all()
- **search_engine::ac_sparse**: Aho-Corasick Sparse (high memory, moderate performance) MPSE
- **search_engine::ac_sparse_bands**: Aho-Corasick Sparse-Banded (high memory, moderate performance) MPSE
- **search_engine::ac_std**: Aho-Corasick Full (high memory, best performance) MPSE
- **search_engine::hyperscan**: intel hyperscan-based mpse with regex support
- **search_engine::lowmem**: Keyword Trie (low memory, moderate performance) MPSE
- **so_rule::3|18758**: SO rule example